

System and Efficiency in Service

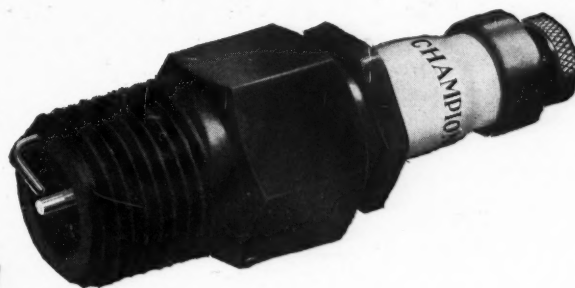
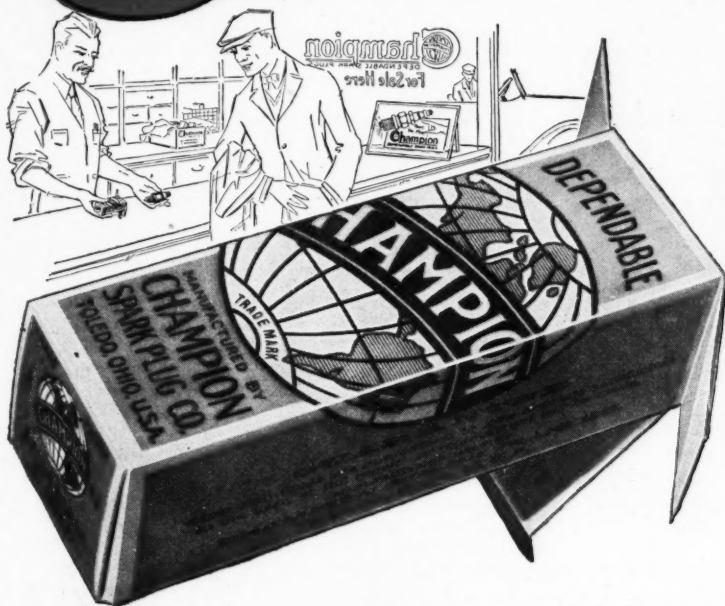
MOTOR AGE

Volume XXXVI
Number 12

PUBLISHED WEEKLY AT THE MALLERS BUILDING
CHICAGO, SEPTEMBER 18, 1919

Twenty Cents a Copy
Three Dollars a Year

Champion Dependable Spark Plugs



Now is the time for dealers to
make sure their stock of Champion
Spark Plugs is complete. Go over
your stock today.

There Is No Substitute For Champion Dependability

The experience of over 240
manufacturers who equip their
products at their factories with
Champion Spark Plugs, together
with the experience of millions

of owners of all types of cars, fur-
nishes the safest guide for pur-
chasers and insures the dealer's
success. There is a Champion for
every type of engine.

Champion Spark Plug Company, Toledo, Ohio
Champion Spark Plug Company, of Canada, Ltd., Windsor, Ontario

PREVENTS ACCUMULATION OF CARBON



You can keep your motor snappy and full of "pep" by *preventing* the accumulation of carbon. Don't wait until your engine is choked and caked with it. Use Johnson's Carbon Remover every 500 miles, then the carbon is removed while it is soft and powdery, eliminating the frequent grinding of valves and *keeping* the motor *always* clean. No experience or labor required—you can easily do it yourself in ten minutes—and the cost is trifling.

JOHNSON'S CARBON REMOVER

Johnson's Carbon Remover is a perfectly harmless liquid to be poured or squirted into the cylinders. Millions of cans have been used with satisfaction. It simply softens the carbon, then the heat from the engine pulverizes it and it is blown out the exhaust. Johnson's Carbon Remover contains no acids and does not affect lubrication.

It is the easiest, cleanest, safest and most satisfactory remedy for carbon. It will save you from \$3.00 to \$5.00 over any other method without laying up your car. A dose of Johnson's Carbon Remover—the engine laxative—will stop that knock—quiet the motor, and give the maximum power with the minimum amount of fuel.



will stop leaks immediately without laying up the car—no mechanical experience required. It contains nothing which can clog or coat the cooling system and is absolutely harmless in every respect. It isn't a makeshift—it's a permanent repair.



This is the ideal repair for tubes, casings and rubber goods of all kinds. No time, labor or heat required. A patch can be applied in three minutes and it's so simple a child can use it. Gives equally good results on a pin hole puncture or on a large blowout.



Here is a preparation with which you can make your gray, dusty top and side curtains look like new. Johnson's Black-Lac is unequalled for blackening fenders, rims, hoods, lamps—and in fact, all worn metal parts. Prevents rust and keeps your car in a high state of repair.

Write for our booklet on "Keeping Cars Young"—it's free

S. C. JOHNSON & SON, Dept. M. A., Racine, Wis.

Autoreelite



*Three
Lights
In One*

**Can Be Extended 12 Feet
From the Windshield**

The 12-foot extension cord and reel are contained in the small, neat, waterproof ball casing attached to the bracket.

*This feature is
found only in
the Autoreelite*

The Autoreelite combines the features of a powerful spotlight with those of a trouble and portable light. Indispensable for night driving. Eliminates the inconvenience of locating the cause of breakdowns with a pocket flashlight.

A twist of thumb and forefinger and the Autoreelite detaches from its base and extends any length up to 12 feet. No trouble getting it back into position as the cord reels in and out on the same principle as a window shade.

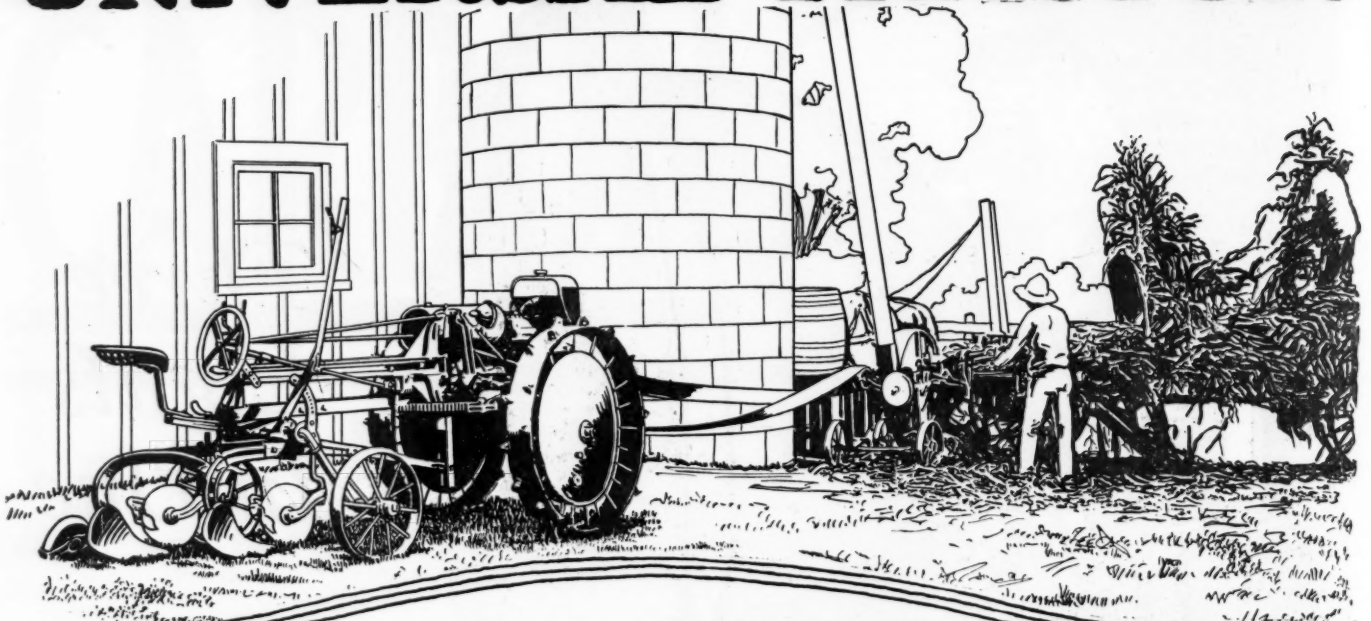
The Autoreelite is no more expensive than the one-purpose spotlight. Materials and workmanship are the best. Always ready for use.

Seven-inch size, \$10. Six-inch size, \$9. All-nickel Sport Model, \$15. Sport Model, with fog-piercing Goldenlyte Reflector, \$20.

Write for booklet MA 207, which gives full details.

ANDERSON ELECTRIC SPECIALTY COMPANY
118-124 South Clinton St. Chicago, Ill.

MOLINE UNIVERSAL TRACTOR



Automobile dealers are missing a bet by not getting into the tractor sales business NOW. The tractor business is the coming thing.

Power farming is coming just as sure as modern, labor-saving farm implements displaced the old hand methods of farming, only it's coming faster. Farmers are more progressive, quicker to adopt new methods than ever before, and they have lots of money.

The Moline-Universal Tractor is past the theoretical stage of the game. It has more outstanding, essential principles and features for economical, satisfactory power farming than any other tractor on the market. And we have facts, figures

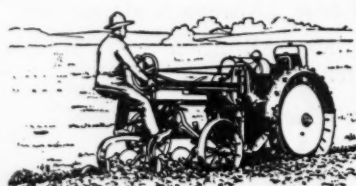
and proof to show its economy and worth to the farmers. It is the coming tractor—the tractor of no regrets. Moline-Universal Tractor owners are boosting owners. One Moline-Universal sells another.

Backed by the Moline Plow Co., a firmly established firm that has been manufacturing good farm implements and growing since 1865, you may be sure the Moline-Universal Tractor is right. The largest exclusive tractor plant in the world enables them to furnish tractors promptly.

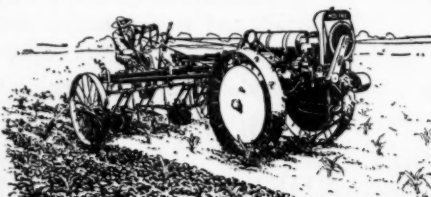
If Moline Tractor territory is not already closed in your locality better get in touch with us at once.

MOLINE PLOW CO.

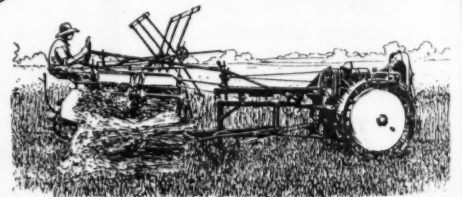
Moline, Illinois



PLOWING



CULTIVATING



HARVESTING

MOTOR AGE

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MOTOR AGE

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"NORMA" PRECISION BALL BEARINGS

(PATENTED)



The unfailing start at the touch of the button—the surge of silent power as the engine takes hold—the sure, swift acceleration—the feel of ample energy in reserve—that confidence in an electrical system always ready and always adequate—these are the things, whether in car, truck, tractor or power boat, that mark the machine of quality and serviceability.

It can be no mere accident that the machines which most uniformly render such service as above defined, are—almost without exception—fitted with magnetos and lighting generators carrying "NORMA" Bearings.

Be SURE. See That
Your Electrical Apparatus Is "NORMA" Equipped



THE NORMA COMPANY OF AMERICA

1790 BROADWAY

NEW YORK

Ball, Roller, Thrust and Combination Bearings

Allis-Chalmers

The 6-12 General Purpose—28-inch clearance for cultivating—a one-man outfit with driver riding on or over implement.

\$1,500,000 Spent to Make These Three Models Right

\$10,000,000 Available for Tractor Sales, Plant, Machinery, Materials

The Allis-Chalmers Farm Tractors

\$10,000,000 is the money available for Sales Co-operation, for Materials, Machinery, and for our huge new tractor plant, just finished—a part of our 116-acre general manufacturing plant at West Allis, Wisconsin.

Send for the details of our Sales Co-operative Plan and how it works for you—the biggest plan ever put behind any farm implement and offered by one of the largest manufacturers of machinery in the world.

ALLIS-CHALMERS MANUFACTURING CO.

Farm Machinery Dept.

Milwaukee, Wisconsin



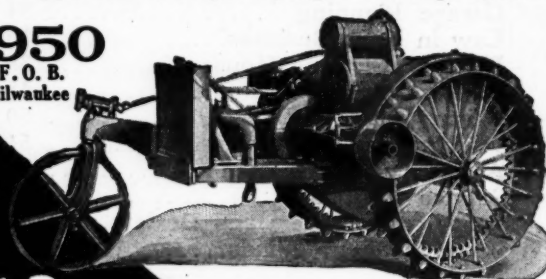
\$795

F. O. B. Milwaukee

Automobile Dealers: There is a big opportunity for you selling tractors. In the past four years we have spent \$1,500,000 in perfecting our three models—this is the price we have been willing to pay for the *good will* of the American Farmer. In making the sales this *good will* must create, you are offered the opportunity of qualifying as our representative.

\$950

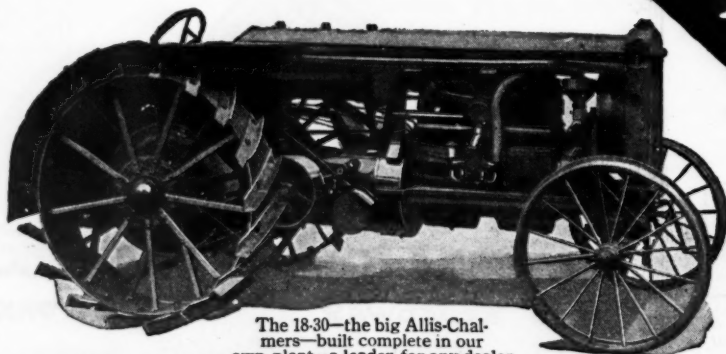
F. O. B. Milwaukee



The 10-18—a three-wheel Allis-Chalmers, double opposed motor, will pull four 24-in. disc plows—other work in proportion.

10-18

18-30



The 18-30—the big Allis-Chalmers—built complete in our own plant—a leader for any dealer.

\$1985

F. O. B. Milwaukee

Get This Coupon in Quick if You Want to Reserve Territory

Allis-Chalmers Mfg. Co. Farm Machinery Dept. West Allis, Wis.

Gentlemen: Kindly send me full details of your Dealer Co-operative Plan.

Name

Street

Town.....

State.....



The Publisher's Service Station

Rendering Service to Help You Render Service



JUST A MOMENT, PLEASE!

Before you turn to the next page, please be sure to give our new "head-dress" a good look. Perhaps you've stopped here before, but were just a little puzzled about who was talking to you through this printed page.

LET'S GET BETTER ACQUAINTED!

The publishers of MOTOR AGE decided some time ago to devote this page of MOTOR AGE to the interests of the entire publication, its readers, its editorial columns, its advertising columns—everything and anything that will make it as helpful as any good service station should be.

"THE PUBLISHER'S SERVICE STATION"

will not only call your attention from time to time to special features in the current number and those to be published in later issues, but will also give you the benefit of its twenty years of serving and building for all who are particularly interested in our field from a maintenance and service standpoint.

"RENDERING SERVICE TO HELP YOU RENDER SERVICE"

is the primary object of this page. It will serve as a medium for closer contact between the editor, the circulation man, the office manager and every other MOTOR AGE employe on the one hand, and the subscriber whom we serve, on the other. It is intended to interpret our thoughts to you and to make clear to you what we are continually aiming to do to serve the trade of which we are proud to be a part.

This page, of course, will be only one small part of each number and is not intended to function as an editorial page. However, we hope to touch on some of the problems that affect you as a reader, the manufacturer to whom we introduce you through the advertising pages, and ourselves.

In "Rendering Service to Help you Render Service" please bear in mind that MOTOR AGE maintains two editorial departments that will work directly with you: "The Readers' Clearing House" and "Garage Planning" that answer all questions pertaining to your business, service or maintenance problems. As a reader, we want you to feel free to call on us at any and all times to help solve your problems in the same way you want your customers to consult you.



Nash Quad Now Standard Equipment For Marine Expeditionary Service

THE Nash Quad, with its record for dependable performance in the service of the Allies during the world war, has been selected by the Standardization Board of the U. S. Marine Corps as standard equipment for expeditionary service.

The selection of the Quad as standard equipment for this use was made after the Marine Corps had conducted exhaustive tests of various trucks, had carefully compared data as to performance and reliability, and after it had had an extended experience with more than 400 Nash Quads in actual service.

This means that from now on Nash trucks go wherever the Marines are sent, to bring up munitions and supplies, and to do all the various hauling tasks for these famous fighters of Uncle Sam.

Nash Passenger Cars

5-Passenger Car, \$1490 2-Passenger Roadster, \$1490 Sedan, \$2575
4-Passenger Coupe, \$2350 7-Passenger Car, \$1640
4-Passenger Sport Model, \$1595

Nash Trucks

One-Ton Chassis, \$1650 Two-Ton Chassis, \$2250
Nash Quad Chassis, \$3250

Prices F. O. B. Kenosha

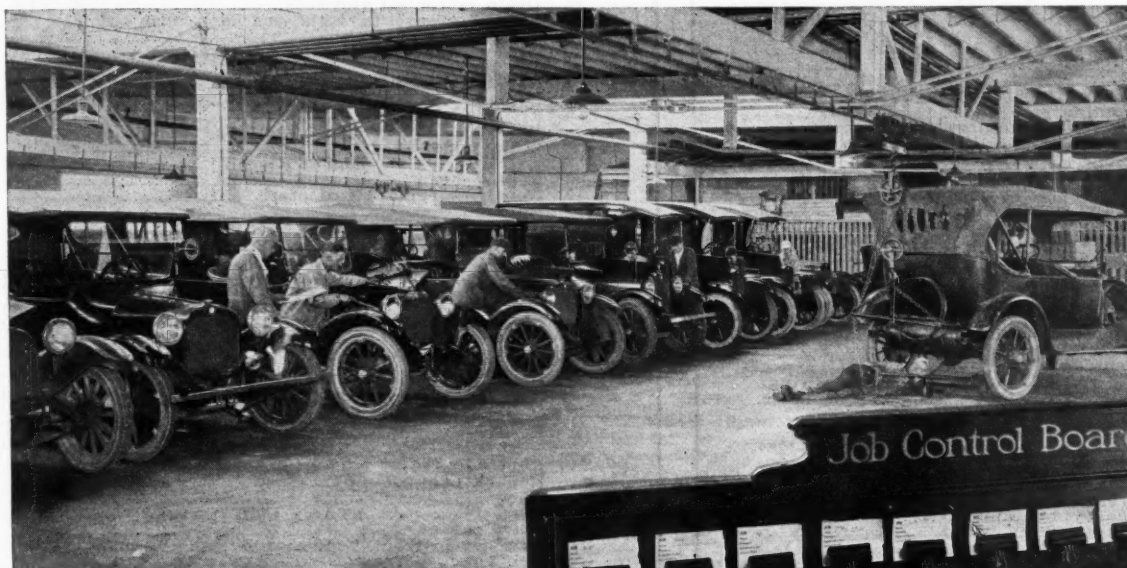
The Nash Motors Co., Kenosha, Wis.

*Manufacturers of Passenger Cars and Trucks
Including the Famous Nash Quad*

NASH MOTORS

VALUE CARS AT VOLUME PRICES

MOTOR AGE



The repairshop has splendid natural lighting. Note the overhead monorail and application

Located in the service manager's office, the job control board is visible record of the cars in process of repairs.



System and Efficiency in the Service Station

In Two Parts—Part I

By Harlan C. Skinner

Motor Age Editorial Staff

A UNIQUE yet simple shop order card, which is the major feature and performs many functions, is the basis for the excellent service system described here. The Schlecht Motor Sales Co., Memphis, Tenn., developed this system to facilitate record-keeping and to promote efficiency.

The shop order card is made up in a single copy and not in multiple, as is the almost universally used triplicate repair order system. It has many advantages over the latter in that it combines in itself a permanent history of the repairs, the operations, the time clock data, the material used, mechanics, foreman's and inspector's recommendations.

All the data comprising a blank shop order card is printed on both sides of a cardboard sheet 8 by 35 in. The upper portion of the front side of the card contains space for data pertaining to the customer's name, address, mileage of car, telephone number, car license number and promised time of delivery, together with a repair order contract which the customer signs and in which he agrees to pay cash for the work enumerated on the work order below.

Repair Operations Listed

Following the service contract is a list

of 132 repair operations which have been compiled especially for the Dodge Brothers car. This list covers practically all the repair operations common to this make of car, and which experience shows are best arranged for ease of handling in the repair shop. Having the operations classified and printed in this manner is a great aid, as it enables the inspector to check item by item and be assured that he has omitted nothing. Furthermore, this arrangement precludes the possibility of the service manager's description being misinterpreted by the foreman or the mechanic in the repair shop.

In connection with this list of repair operations or master sheet, is shown on

CAR IN	CAR OUT	INVOICE PAID																																																																		
Schlecht Motor Sales Co.																																																																				
NAME <i>Dr. J. P. Jones</i>	Address <i>145 Parkway</i>	JOB 3965																																																																		
New Car	Demonstrator	Truck																																																																		
Service	Second Hand	Date <i>AUG 13 1919</i>																																																																		
You are authorized to make such repairs as are checked in squares provided below, which I agree to pay for in cash. This order is accepted by the Schlecht Motor Sales Co. only on condition that we are not liable for damage by collision, fire or theft. Car delivered to undersigned in good order.																																																																				
By <i>Dr. J. P. Jones</i>	Tested by <i>S.</i>	Accepted By <i>Dr. J. P. Jones</i>																																																																		
Invoice No. <i>23897</i>	Signed																																																																			
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CHASSIS

1.75 New Fender

.50 Straighten or repair Fender

.50 Tighten body and motor leg bolts

.50 Tighten spring saddles

1.00 Rebush Spring

1.50 Repair or renew Spring (except upper quarter)

1.00 New running board, mat and binding

.25 Straighten or renew radiator splash shield

1.00 Straighten or renew splash apron

MOTOR

1.00 Remove miss from motor

4.50 Scrape carbon

1.00 Grind valves and scrape carbon

1.00 New cylinder head gasket

.25 Tighten cylinder head studs (new if stripped)

.25 Tighten fan belt

2.50 Remove play from pump shaft

8.00 Replace burnt out bearings

2.50 Tighten main and connecting rod bearings

1.50 Clean out oil feed pipes and examine oil float

1.50 Rebush wrist pins (out of motor)

1.50 Tighten or renew fan pulley

.75 Renew, rebush or repair fan

12.00 Rebore motor and fit oversize pistons and rings

Completely overhaul motor

Stop oil leak at

6.50 Tighten starter sprocket on crank shaft (old style)

.50 Tighten starter chain

FUEL SYSTEM

1.50 Clean carburetor and vacuum

.75 Clean gas line, syphon and tank

Repair gas tank at

Stop gas leak at

New Gas line

.50 Repair choker

Repair throttle rod

.25 Repair accelerator shaft bearing (except where floorboard is broken)

IGNITION SYSTEM

.25 Clean distributor and adjust points

.25 Clean spark plugs and adjust points

Repair magneto

.25 New spark plug Cylinder

.50 Repair or replace ignition switch

.50 Clean and tighten all electrical connections

.25 Retime ignition

COOLING SYSTEM

Repair radiator

.25 New top radiator hose

.75 New bottom radiator hose

.75 Tighten or repack water pump glands

.10 Tighten radiator reach rod

Flush out radiator, see that motor does not heat

Thaw out radiator, see that motor does not heat

Stop all water leaks

STEERING

.50 Align front wheels

4.90 Straighten tie rod and front axle

1.00 Straighten Steering arm

1.00 Straighten drag link

1.00 Remove play from steering post top bushing

.25 Remove play from steering post clamp

Car steers hard

3.00 Remove play from steering (rebush gear)

.75 Rebush tie rod

2.50 Rebush spindles (except where axle is removed)

2.50 Steering gear loose in frame

CLUTCH

.50 Clutch drags (no relining)

.50 Clutch slips (no relining)

.50 Clutch bites (no relining)

8.00 Replace clutch plates or reline

8.00 New clutch throwout collar

Clutch and brake shaft stuck

.50 New clutch throwout grease tube

TRANSMISSION AND UNIVERSAL

.25 Grease transmission

.25 Grease universal

6.00 Overhaul transmission

Weld transmission case

5.50 Straighten or renew transmission steel member

New universal joint and housing

BRAKES

.75 Tighten brakes and equalize

Repair hand brake latch

4.00 Reline internal brakes and equalize

1.50 Remove wheels and clean brakes and adjust

4.00 Reline external brakes and equalize

Free brake shaft

.25 Oil brake linkage

REAR AXLE

8.00 Straighten axle housing

12.00 Rear axle noisy

Repair or renew axle or propeller shaft

.25 New rear brake adjusting stud

12.00 Overhaul rear axle (exclude brakes)

2.00 Tighten brake carrier housing

OILING

.50 Oil and grease cups only

1.00 Repair oil pump and gauge

.25 Drain motor oil and refill

2.00 Oil and grease, in whis. and spgs., also bdy. jts.

1.00 Remove all squeaks

Replace missing grease and oil cups

BODY

Repair Door

Replace Window

.50 Fit floor boards

Remove dent from

Weld body at

ELECTRICAL

1.00 Repair horn

.50 Repair or replace ammeter

Repair

.25 Set up generator charging rate

4.50 Repair starter

2.00 Repair starte switch

Renew Wires

8.00 Complete electrical overhaul (except battery)

WINDSHIELD

1.00 Straighten or repair windshield stanchion rubber

New windshield glass

.50 New windshield frame

TOP

Repair top

Repair cushions

Re-cover

MUFFLER

1.50 Repair or renew muffler

Repack exhaust pipe

START CAR

Start car at

Tow car in from

Drive car in from

Leave car at

INSPECTION

Test car for

MISCELLANEOUS

2.50 Tighten all bolts and nuts

Remove rattles and squeaks

.50 Replace or tighten hood latches

Repair speedometer

ACCESSORIES

.50 Install Johnson Lock

.25 Install McKee Lens

.50 Install bumpers

FINISH

Wash, polish and clean engine

Clean upholstery

Clean and enamel engine

Simmonize

Touch up body and paint chassis

JOB 3965 Name <i>Dr. J. P. Jones</i> Promised <i>to date</i> Estimated Labor <i>None</i> Special Work		Schlecht Motor Sales Co. Dodge Brothers Service Station 135-136-137 Service Station Phone Room 401 Receipt for Car on Job 3965 All Repairs Strictly Cash. This Receipt Must Be Surrendered on Delivery of Car. Not Responsible for Valuables Left in Car or Loss by Fire. Estimates are Approximate and for Labor Only.
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The upper portion of the shop order is a repair contract combined with the customary car information

the left of the list, in an individual column, a series of numbers and decimals printed in red, and representing the time in hours and decimal equivalents required to do certain repair operations. The fig-

ure opposite each repair operation is the maximum time a mechanic is allowed for performing this work.

This feature of the shop order card decreases very markedly the time consumed

The lower portion serves the dual purpose of being the owner's claim check and a record for the job control board

for each operation. To the right of the list of repair operations, columns are provided for the mechanic's name, his hourly rate, an extension column and an elapsed time column. Note that for each

REMARKS:
Here mechanic will please state any repairs, which, in his estimation, should be made; also itemize work you have done and explain any unusual conditions that delayed job or that may prevent it from being thoroughly satisfactory.

*Body & motor leg bolts should be tightened
otherwise OK*

Signed *Sears - Inspector*

MATERIAL AND OTHER CHARGES

DATE	No.	Part No.	ITEMS	Regulation No.	EXTENSIONS
8/13	1	1120	Cylinder head gasket	9981	1.25
"	1	C13	Inspection gasket	9989	1.10
"	1	212	Starters chain	10012	1.50
"	3	1360	Motor valve	10016	2.40
"	1	1120	Cylinder head gasket	10031	13.00
"	1	1120	Compression pump	10034	1.00
"	2	820	Oil flange gasket	10037	.20
"	6	1140	Hydraulic pump	10039	.30
"	1	1166	Set of valves	10122	1.25
"	1	1179	Barley Spine Nut	10122	4.20

The upper portion of the reverse side of the shop order provides space for recommendations and a record of the material used

Total Materials, \$31.20

3.0 Hours mechanics labor at	\$ 3.60
Hours machinists time at	
1.2 Hours electricians labor at	\$ 1.80
7 Hours tinner's labor at	\$ 1.05
Hours cabinet workers labor at	\$ 1.05
Hours helpers labor	\$.75
5 Hours <i>unlabeled</i> labor	\$.75
TOTAL LABOR, \$7.45	
GRAND TOTAL, \$38.65	

This Service Station is not operated for PROFIT. Its sole purpose is to secure service for Dodge Brothers owners at a minimum cost. With the object of low service cost in view, we have installed the most modern and costly of time-saving machines and Dodge Brothers tools. We have our electricians and electrical department, our machinist and machine shop, our cabinet worker, blacksmith, welder and tinner, all of which makes for low cost repairs.

Attached to your windshield handle you will find a self-addressed postcard—if you are in any manner dissatisfied with our service, however minor, won't you kindly fill in this card and mail it. Or if you prefer, a phone message will bring the undersigned to you.

SERVICE DEPARTMENT
Charles Godlove, Superintendent

At the lower end of the reverse side of the shop order is a form for summarizing the job and carrying out the totals for the charges

operation the mechanic clocks in on this operation on the extreme right of the front side of the shop order and clocks out on the extreme right on the reverse side of the order. All operations are numbered consecutively, and these numbers appear in the clock in and out column on both sides of the sheet so time will be sure to be placed in the proper space.

The advantage of this feature is that the mechanic's pride compels him to make a favorable showing in the elapsed time column against the maximum time allowed for the job, as shown on the left of the list of repair operations. The printed time allowance figures also have other advantages. If a customer desires an estimate, it is simply necessary to add the decimals appearing after the checked items on the adding machine and multiply the total by the rate per hour.

The job card in the lower left corner of the shop order performs two functions. First, it is a register of the shop order, insuring that each card is returned to the service office, and, second, it is posted on the job control board, which enables the service manager to see at a glance the amount of repair work in the shop and also to determine whether or not he is going to be able to deliver the car at the time of promised delivery. A glance at the job control board from time to time determines when the next car is promised, and affords plenty of time for the service manager to get into communication with the shop and determine how the job is progressing.

Registering Material

On the reverse side of the shop order space is provided at the upper part for the inspector to make his report regarding the mechanical condition of the car. This is part of the service plan, and the statement of the inspector is copied onto the customer's invoice in a place provided for that purpose, so it is merely a part of the system for the customer to get this information automatically.

ADJUSTMENT ORDER No. 723
Schlecht Motor Sales Company
SERVICE DEPARTMENT
Pauline South of Union.

Date AUG 13 1919

Name *Mr. Robt Jones*
Repair *Light has blown out front beam*
Mechanic *Stewart*

FINISH AUG 13 1919
START AUG 13 1919

ELAPSED TIME	RATE	AMOUNT
4	1.50	60
MATERIALS:		
<i>Head lamp globe</i>		35
TOTAL		\$ 95

RECEIPT No. 723
Schlecht Motor Sales Company
SERVICE DEPARTMENT.
Pauline South of Union.

\$ 95
Please present this stub in event of error.

Blue card 4 by 7 in. for minor adjustments. This saves making out an invoice for small jobs

Material Requisition No. 17979

JOB NO. 2754 DATE 8/22 1919
ACCOUNT Cash

QUAN.	PART NO.	ITEM	AMOUNT
1	490	Hub Cap	1.45

JOB NO. 80 DATE 8/22 1919
ACCOUNT Owl Auto Co

QUAN.	PART NO.	ITEM	AMOUNT
1	887	Axle Shaft	4.25

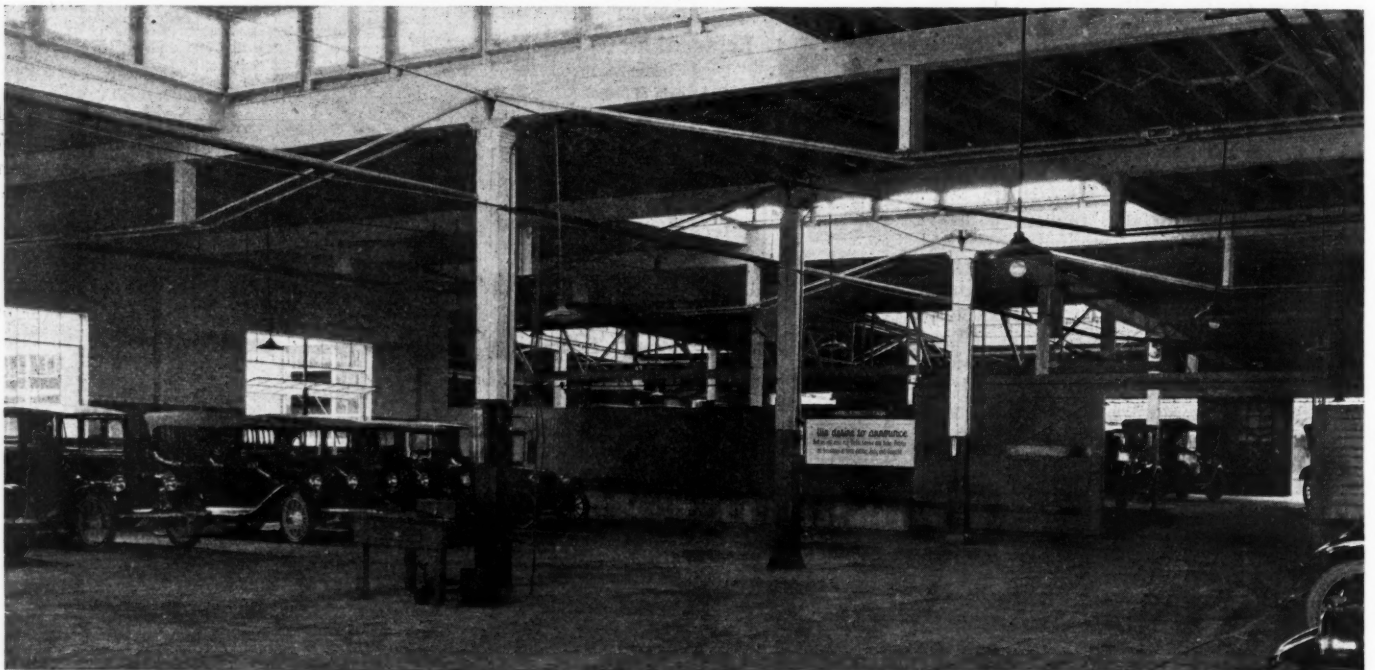
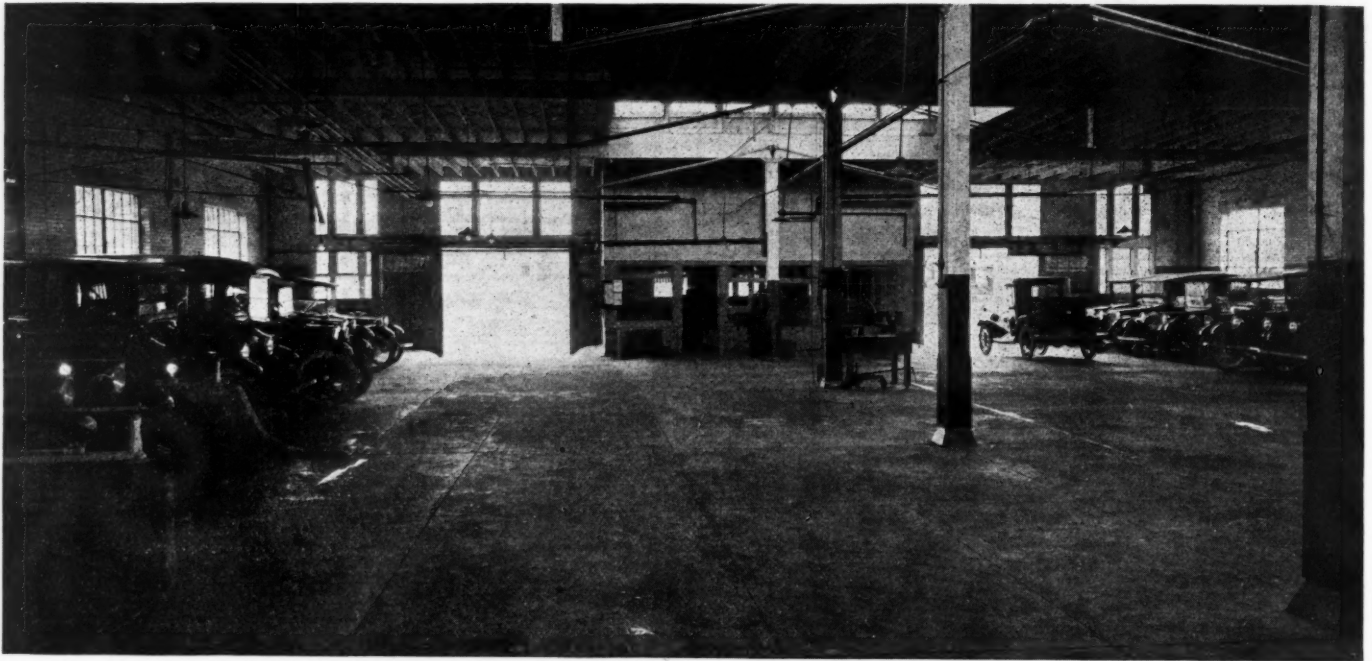
JOB NO. 684 DATE 8/22 1919
ACCOUNT Dr. Tom Spick

QUAN.	PART NO.	ITEM	AMOUNT
1	2373	Iron Belt	.50
1	4407	Top Rad. Hose	.25

JOB NO. new cars DATE 8/22 1919
ACCOUNT

QUAN.	PART NO.	ITEM	AMOUNT
1		gal cyl Oil	.90

Ten requisitions are placed on one sheet 12 by 14 in. to simplify filing and handling stock orders in the shop



Mr. *T. S. Jones*

AUG 13 1919

Won't you be so kind as to enumerate in the space below any criticisms or suggestion you may have as to this repair or our Service, and mail to us at your convenience.

Phones Hemlock 461-135-6-7

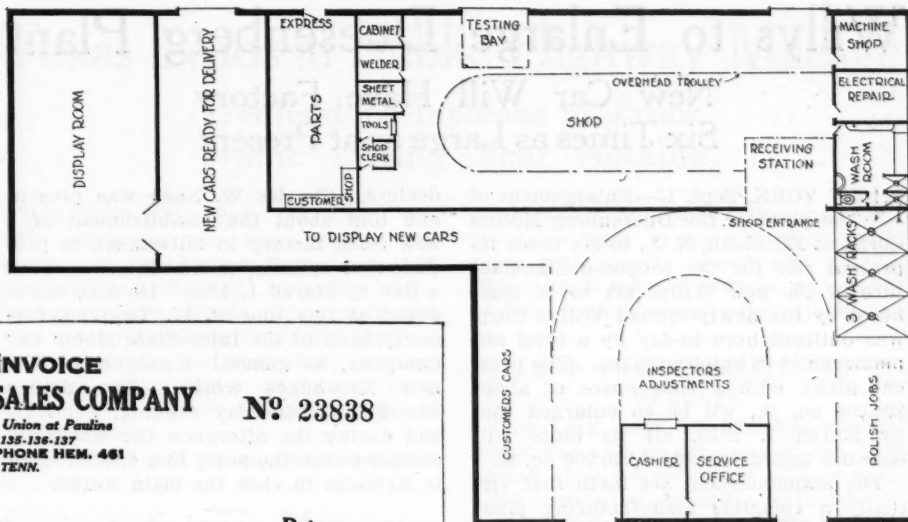
Thanking you, we are,
Schlecht Motor Sales Company

We suggest you Drain Motor Oil every 500 miles. Tighten Starter Chain every 800 miles. Align front Wheels every month. Fill all Grease Cups every 200 miles. Remove Wheels, Grease and Adjust Bearings every 2000 miles. Grind Valves and Scrape Carbon every 5000 miles. Tighten Spring Shackles and Springs Clips and Body Bolts every 500 miles. Clean Carburetor every 1000 miles. Refill Universal every 500 miles. Examine Transmission and Differential every 1500 miles.

The service floor from the shop entrance, showing location of offices between entrance and exit doors, with, in center, part of the service floor as seen from the service manager's office

Suggestion card 3 by 6 1/4 in. for owner's use in hints as to care of car

Following the space provided for the inspector's report is a form for registering the material used on the job. This information is very complete, as columns are provided for the date, number of items used, part number, description of part, requisition number and a price extensions column. At the lower portion of the card is a form for summarizing the job, where is shown division of labor among the various departments of the shop and the total amount of material



Floor plan of Schlecht Motor Sales Co., showing location of departments and method of routing the work



SERVICE INVOICE SCHLECHT MOTOR SALES COMPANY

No. 23838

Service Department, Union at Pauline
Telephone Main, 135-136-137
SERVICE STATION PHONE HEM. 461
MEMPHIS, TENN.

Dr. Sam T. Jones

Address 14 S. Parkway

Date 8-13-19.

This invoice covers the following operations:

Straighten Right Front fender, Scrape carbon,
Tighten starter chain, Align front wheels,
Oil and grease car, incl. whls. spgs. also bdy. jnts.
Repair starter switch, Straighten left windshield stanchion,
Install Johnson lock.

Special Remarks:

Note: Body and Motor Leg Bolts Should be Tightened, Otherwise O.K.

AMOUNT	DESCRIPTION	PRICE
1	Cylinder head gasket,	1.25
1	Inspection gasket,	.10
1	Starter chain,	7.50
3	Motor Valves,	2.40
1	Johnson lock,	13.00
5	Lbs. Compression Grease,	1.00
2	Axle Flange gaskets,	.20
6	Grease cup caps,	.30
1	Set starter contacts,	1.25
1	Battery to frame wire,	4.20
Use of Service Car.....		
Wash and Polishing.....		
Mechanics' Labor.....		3.85
Electricians' Labor.....		1.80
Machinists' Labor.....		
Sheet Metal Workers' Labor.....		
Cabinet Workers' Labor.....		1.05
Welders' Labor.....		.75

TOTAL, \$ 38.65

All Claims Must be Filed With Service Manager in Two Days After Delivery of Car.

Customer's invoice 8 1/2 by 10 3/4 in. with provision for brief of job and inspector's recommendation

used in dollars and cents. The entire job then is extended to a grand total giving the retail cost of the job. Thus the complete history of the job is available by referring to only one form.

When a car is passed by the inspector as properly done he attaches to the wind-

shield a suggestion and complaint card. This card has inserted in the space for that purpose the owner's name and enables the service men to identify the car, encourages the owner to make suggestions, gives him the impression that the company is striving to give satisfactory

service, and instructs him as to timely adjustments and repairs on his car.

A rather unusual material requisition sheet is used in that it has ten requisitions in one, each page of requisition being serially numbered. The reason for having this form arranged in this manner is that it simplifies filing and consequently makes it very easy to refer to this requisition at a later time. When a mechanic desires a part he comes to the shop clerk and states his requirement. The shop clerk in turn authorizes the stockroom clerk, who is at his elbow, to make delivery of such a part. The stockroom clerk enters the article wanted, the price and the material requisition number as well as the owner's name. In any repair job it is quite likely for each job a considerable number of items will be required, and hence this method eliminates the necessity of writing the dates, job number and the owner's name each time any additional part is required.

Customer's Invoice

The customer's invoice forms are conventional with one exception. The bill clerk's typewriters are equipped with red and black ribbons. The body of the invoice materials, name of owner, etc., are written in black. Special remarks and labor appear in red. The special remarks include such citations, under the head, "Special Remarks." For example, a notation is made that the body and motor leg bolts should be tightened, otherwise the car is O. K.

The reason for this is purely psychological. The company desires to have the owner know it is sufficiently interested in his car to make voluntary inspection and such recommendations as will be for the owner's interest. It also is desired to stamp on the owner's mind the distinction between that part of his repair bill which is labor and that part which is material. When considering this feature of the invoice form, one must bear in mind that efficient management can control the cost of labor on jobs but cannot control the cost of parts.

Willys to Enlarge Duesenberg Plant

New Car Will Have Factory Six Times as Large as at Present

NEW YORK, Sept. 13—Enlargement of the plant of the Duesenberg Motors Corp., at Elizabeth, N. J., to six times its present size for the proposed manufacture of the new Willys six to be marketed by the newly-formed Willys Corp. was outlined here to-day by a brief announcement of building plans. The present plant, with a floor space of about 200,000 sq. ft., will be so enlarged that by March 1, 1920, all its units will measure approximately 1,200,000 sq. ft.

The announcement set forth that virtually a complete manufacturing plant for cars would be constructed, so that early next year a daily production of from 400 to 500 machines might be run out of the new plant. Complete units for the construction of almost all parts of the proposed car will be built at Elizabeth, although it was admitted that many parts and accessories would have to be obtained from outside sources.

The Elizabeth plant will be known as the Duesenberg unit of the Willys Corp. The other large units will be the New Process Gear Corp., at Syracuse, N. Y., and the Electric Auto-Lite Corp., at Toledo. The gear company will make transmissions, axles and similar parts for the Willys car, and the Toledo concern will supply electrical equipment. From the information obtained, no further enlargement of those two plants, aside from those previously announced, are now under contemplation.

The present Duesenberg plant is located on a tract of land about 12 acres in extent. Purchase of additional property has brought this up to 35 acres. Work has started on razing the present buildings, and the construction work of the new plant units will be under way soon.

Complete details of the proposed construction were not made public. However, it was stated that all buildings would be of concrete and steel and that the main structure would be a four-story building 1400 ft. long.

TWYMAN HEADS MILWAUKEE NASH

Milwaukee, Wis., Sept. 13—B. W. Twyman, formerly head of the Inter-State Motor Co., Muncie, Ind., has been appointed general manager of the new Milwaukee plant for the Nash Motors Co.

This year's state fair show attracted many more of the big men of the industry than usual, making it equal to the midwinter show in this respect and in the holding of conferences with dealers by distributors, who thus take advantage of the general round-up of their retail representatives in Wisconsin and northern Michigan.

The principal event of this character was the dinner given by the Nash Sales Co., wholesale distributor of the Nash line, for its 300 or more dealers and sub-

dealers. Charles W. Nash was present and told about the establishment of a new Nash factory in Milwaukee to produce four-cylinder cars at the rate of 100 a day by March 1, 1920. He also introduced at this time P. W. Twyman, formerly head of the Inter-State Motor Car Company, as general manager of the new Milwaukee works. The dinner was held Wednesday evening, Sept. 10, and during the afternoon the wholesale company took the party in a special train to Kenosha to view the main works.

DEALERS OF WEST TO MEET

Colorado Springs, Col., Sept. 12—Several hundred dealers of the west will assemble here at The Broadmoor hotel Oct. 6-8 when the Rocky Mountain Auto Trades Association will hold its annual convention. A program has been arranged by the secretary of the association, Harrison Goldsmith of Denver.

It is expected that from 600 to 900 delegates will be present from Colorado, Utah, Wyoming, New Mexico, Idaho, Texas, Kansas and Nebraska. The sessions will be held in the theater at the Broadmoor, and the golf club will be used for committee meetings. A trip will be made to the summit of Pike's Peak over the highway that is considered one of the big achievements of the west.

Speakers of national prominence will address the convention as follows:

Edward S. Jordan, president of the Jordan Motor Car Co.; Mark Skinner of the United States Internal Revenue Department; Ray Sherman, editor of Motor World; F. W. A. Vesper, president National Automobile Dealers' Association; Harry G. Mock, secretary and business manager of the National Automobile Dealers' Association.

NEWMAN HEADS PLANE SALES

Chicago, Sept. 12—Harry Newman, prominent in the Chicago trade for many years and for the last few months in the sales department of the United Aircraft Engineering Corp., has been placed in charge of sales and advertising for that corporation. Mr. Newman was largely instrumental in selling through dealers throughout the country the 400 training planes which the United Aircraft Engineering Corp. bought from the Canadian government.

Sites for new factories and assembly plants are under consideration by the corporation, and it is expected a factory will soon be established in the Chicago district. A deal is pending for the ground for a Chicago factory, and if this goes through, work on the plant will be started as soon as labor conditions permit.

Purchase of considerable quantities of Government airplane materials by the corporation in the last few weeks has made the present factories on Long Island and in Toronto too cramped for the company's activities. It is believed the opening of a new plant in the Middle West will increase the output of ready planes more than 100 per cent.

Permanent headquarters have been opened in Chicago by the company for the sale and distribution of planes.

The Sad, Sad Tale of Harry

His Friends Wouldn't Help Him, Nor Would His Bankers, So—

AND the moral of this tale is—? Well, read it; and then you can append your own moral.

For a number of years, Jim Levy and Harry Newman, two of the leaders in Chicago motordom, were at sword points. They got that way on account of distribution rights. First Jim had a car and Harry took it away from him. Then Jim took it back and then Harry came right back and took it again. All of which made Jim as popular with Harry and vice versa as golden rod is with a hay fever victim. It wasn't even safe to mention one's name in the presence of the other. The writer knows this because he perpetrated the terrible blunder one time.

Then Harry got out of the motor car business and for many months was engaged in war work. When he got back to making money for himself, his first venture was a flivver and tied up most of his ready capital. But he wasn't discouraged. He had lit on his feet too often to be discouraged by a little thing

like being broke. So he looked around.

In his search for something to help he stumbled upon an opportunity to purchase a number of Canadian government airplanes at rock bottom price. It looked like the chance to enable him to look at his bank balance without shedding tears. He secured an option on the planes and set about finding financial backing to enable him to sell the planes.

Doing that little thing was like selling raincoats to a flock of ducks. Harry walked three pairs of shoes thin parading between different banks and from friend to friend trying to secure the necessary backing. But there was nothing doing.

Finally, when he was almost discouraged, Harry began to take considerable thought to himself. And at last he conceived a brilliant idea.

"Here I've been to every bank I ever did business with," he thought to himself. "And I've been to every person I know who has ever said he liked me or who even was civil to me. And there

still remains an aching void where I want a lot of capital. This won't do. If my friends won't help me, maybe my enemies will. I'll start it by going to the fellow who likes me least of anyone in this large and prosperous city."

So, in fear and trepidation, Harry approached his old enemy, Jim, mounted on a fleet horse so he could make a getaway if he wished. Jim was taken so by surprise that Harry had a chance to start talking before Jim arose and slew him. And once the talk started, Jim grew interested. The talk prolonged itself to a conference and the upshot was that Jim decided to take a flier.

Together the two old enemies hid themselves to New York and there Jim put up \$10,000 on the scheme. Hardly had he put the money up than Harry had packed up the old carpet bag and gone out into the "territory" to sell the planes. Within 56 hr. of his departure, cash deposits of \$40,000 for planes were to the credit of the new partners.

That's the story of it. It isn't particularly new,—in fact all this happened some months ago. But it is interesting just now that Jim is Chicago distributor for the airplane company of which Harry is sales manager. And it is rather interesting that the associates split \$208,000 profit on Jim's investment of \$10,000 and Harry's investment of taking a chance with an old enemy.

The moral? Well, if you can't carve one out for yourself, we can't help you.

WAGNER GOES TO FACTORY

Indianapolis, Ind., Sept. 15—A. B. Wagner has resigned as manager of the Indianapolis Marmon to become assistant purchasing agent at the factory.

Firestone Capital Increase

August Sales Largest in History of Company—Expansion Plans

AKRON, OHIO, Sept. 12.—A resolution to increase its capitalization from \$15,000,000 to \$75,000,000 passed without a dissenting vote at the annual meeting of stockholders of the Firestone Tire & Rubber Co. The company will sell \$10,000,000 of seven per cent preferred stock. In explaining the reason why so small a portion of the issue will be sold, President H. S. Firestone said:

To Sell Part Only

"We contemplate selling only \$10,000,000 worth of stock as this is sufficient to meet our needs. Less than three years ago we increased our capital stock from \$1,000,000 to \$10,000,000. At that time we had no thought of using more than \$5,000,000 of the preferred issue and with that experience in mind we have decided to make our preferred capital stock large enough so we may issue more at any future time without expense and complications. It is necessary to have half as much common as preferred stock, therefore it is necessary to increase the common stock issue of \$25,000,000 and the

Texas Leads in Public Highway Mileage

Tremendous Increase in Truck Traffic During Year Notable

WASHINGTON, Sept. 13—Cash expenditures on rural roads and bridges in the United States for 1918 amounted to \$298,098,193, according to the Bureau of Public Roads. The report adds that the most striking single development of the year was the tremendous increase in truck traffic. Motor trucks now comprise 5 per cent of the grand total of motor vehicles.

In 1918 11,944 miles of roads were

miles of surfaced roads. Texas with 128,960 miles leads in the matter of public roads with Kansas second with 111,052. Ohio with 31,800 and Indiana with 31,000 surfaced roads lead all other states.

CAR AND TRAILER BODIES TO CO-OPERATE

New York, Sept. 12—The five national motor car and trailer associations have agreed upon the formation of a co-operative conference committee on legislation and will establish headquarters here for the furtherance of the work planned, principally in an effort to cut down car thievery and to boost the construction of good roads.

The organizations, in addition to the Chamber of Commerce, will be the National Automobile Dealers' Association, the Motor & Accessory Manufacturers' Association, the American Automobile Association and the Trailer Manufacturers' Association. Meetings of the committee will probably be held weekly at the N. A. C. C. Representatives of the various associations have not been appointed.

\$5,000 FOR ROADS CAMPAIGN

Chicago, Sept. 15—Members of the Chicago Automobile Trade Association at a special meeting this week voted \$5,000 to assist the Associated Roads Organizations of Cook County in its campaign for the \$5,000,000 county bond issue which comes up for a referendum vote at the November election. Of the amount voted \$2,500 is to be devoted toward defraying expenses already incurred by the roads organization, while the rest will be spent by the trade association for advertising the issue.

Members of the trade association also were urged by George Bird, former president, to get together on their express shipments and by co-operation cut their expenses. A forwarding company in Detroit is willing to give express service at freight rates if the Chicago dealers will guarantee a full carload shipment each day, and as easily twice that much supplies comes into Chicago by express each day, Mr. Bird pointed out that acceptance of the forwarding company's offer would result in considerable saving.

CHEVROLET JOINS MONROE

Indianapolis, Ind., Sept. 15—Louis Chevrolet has become associated with the William Small Co. as consulting engineer. Chevrolet will work out designing problems for the Monroe car, now being built by the company. He has been commissioned too to build a fleet of racing Monroes to campaign in all the big events of the 1920 season, including the Indianapolis 500-mile race.

Factory Service Managers to Meet

NEW YORK, Sept. 15—Discussions of service problems will form the program for the meeting of factory service managers under the direction of the National Automobile Chamber of Commerce, to be held, probably at Detroit, the week of Oct. 27. Organization of service associations throughout the country was stopped during the war and it is hoped the October meeting will serve to revive the plan.

built, 203,556 miles of road maintained and 12,973 bridges constructed. All of this work was accomplished by the various states with the aid of the Federal government. There is now a total of 2,478,552 miles of public rural roads in the United States, which includes 299,135

preferred to \$50,000,000. We do not contemplate making any issue of the common stock at this time."

Firestone sales from Nov. 1, 1918, to Sept. 1, 1919, were \$69,475,197.14 as against \$63,821,046.67 for the same period last year, an increase of 9 per cent. This increase was in spite of the fact that prices were reduced from 15 to 32 per cent. Sales in August, 1919, were the largest in the history of the company. An increase over August of last year of \$2,456,994.30, or 31 per cent, was recorded.

Plans for the immediate construction of a \$400,000 mechanical building were disclosed at the meeting. This will be located in the rear of plant No. 2. Plan No. 2 was designed for a capacity of 10,000 tires a day but with additional equipment already ordered, at a cost of \$1,500,000, its capacity can be increased to 16,000 tires a day. Plant No. 1 will be converted from fabric tire manufacture to cord tire work.



EDITORIAL



Of Real Service

A SYSTEM of forms or shop management that functions successfully is of great assistance to the service station in which it operates. But if that service station passes its experience in this line on, the system becomes of greater value insofar as it is measured by the extent of its influence. That is, if you as a service station operator have some little kink or turn of hand, some system of forms or shop management, that you know has helped you solve your problems and you pass that information on for the benefit of others in the industry, you are doing a service of illimitable value both to yourself and the industry you benefit.

AS it is not always possible for this to be done directly, it is up to your trade publication to act as intermediary, and hence Motor Age renders that service which makes the successful system of service of value to a wider extent. In this issue appears the first half of a system which has proved successful in Memphis. There is every reason to believe the climate had nothing to do with its success. It is a poor system that won't give ideas to more than one also.

THIS is but one of many successful systems Motor Age is offering its readers just now. It will pay you to follow them closely and to put into operation the ideas they give you.

Meeting Service Problems

AS we go to press we note the factory service managers will meet next month under the auspices of the National Automobile Chamber of Commerce to discuss service problems. The importance of this meeting cannot be underestimated. Not only is it of importance to factory service but to service throughout the industry, and to those who render that service. The only way to meet service problems is, first, to recognize them. Add to this a discussion of ways and

means of solving those problems, and the battle is more than half won.

IT is too true that service organizations have not been developed as fully as they should have been. And it is to be hoped that the greater realization of the need for better service that grew out of the abnormal conditions during the war will materialize in greater activity along these lines.

Equipping the Shop

IF one is to equip a small shop with machine tools, good judgment must be used in their purchase, as it is a comparatively easy matter to tie up a lot of money in such an investment which is bound to be more or less inactive unless one has an unusually large business.

About all the small repair shop needs is a lathe large enough to test crankshafts, camshafts, shafts, etc., for trueness, a drill press, an arbor press, an emery stand and the usual assortment of small tools for use with these machine tools.

IN the average-sized city there ordinarily is one well-equipped machine shop capable of doing most of the more complicated machine work; hence it does not pay the small operator to load up with a lot of unnecessary machines.

IT is not good policy to buy a lot of machine tools with production refinements, as there are many other places in a service station where this money can be invested to greater advantage. This is particularly true of the repair and accessory stocks, which represent a more active investment.

Shipping by Truck Pays

IN its campaignship of the ship-by-truck idea it is logical that Firestone should accumulate data of a nature valuable not only to its own organization in its activities of this kind but data valuable to the public at large. Among other information gained is that the cost of haulage by horse or wagon and by motor. For instance, careful investigation shows the cost of wagon haulage averages 33 cents a ton per mile, while motor haulage averages 15 cents a ton per mile.

to the selling point is 7 miles. About half of these 70,000 dairymen make the round trip every day in the year. Horses and wagons take 2½ hr. for the trip. A truck covers the distance in about half an hour, while a large truck goes further and combines the deliveries of thirty or more producers. A daily saving of 70,000 hr.

ADD to the Firestone figures those compiled by the National dairy association, and the fact is even more evident. A recent analysis of the dairy business of 70,000 farms in the country showed each produced an average of 10,000 gal. of milk annually. Of this amount half was hauled to the creamery, a fourth to the milk depot, 12 per cent to the cheese factory, 10 per cent to the condensary and 3 per cent was used on the farm. The average round trip by the dairyman

BOTH time and costs are thus saved, and since time is worth money, especially in this day of shortage of help, the ship-by-truck movement fills an urgent need. Last year, taking the United States as a whole, the cost of wagon hauls from farm to shipping point averaged 30 cents a ton a mile for wheat, 33 cents for corn and 48 cents for cotton, whereas truck or tractor transit averaged 15 cents for wheat or corn and 18 cents for cotton. Consider what this would amount to if the saving was applied to haulage in your community alone, and you immediately see the sales possibilities.

Army to Auction 1,243 Unserviceable Motors

War Department States It Has No New or Serviceable Cars for Sale

WASHINGTON, Sept. 12—Auction sales of 1243 unserviceable Army cars were announced today by the Motor Transport Corps. Those to be sold include cars, trucks, ambulances, motorcycles, sidecars and bicycles that "in their present condition are unserviceable for army use, but a number of them can be made perfectly usable by proper repairing."

The announcement states the War Department "has no new or serviceable passenger automobiles for sale at present and it is not anticipated that it will have any new passenger cars available for sale to the general public."

The first sale will take place Sept. 18, at Camp Holabird, Md., where 295 unserviceable vehicles will be auctioned. It will consist of fifty cars, including Studebakers, Hupmobiles, Overlands, Liberties, Reos, Buicks, Grants, Paiges, Velies, Hudsons, Maxwells, Loziers, Fords, Packards and Chevrolets; five light delivery trucks, principally Fords; ninety-three 2-ton trucks of various makes; ninety-nine Nash trucks, twenty-seven 3-to 5-ton trucks of various makes; eight motorcycles, and five Excelsior solo and sidecars.

Another sale will be held Sept. 19-20 at the Army Supply Depot, Norfolk, Va., and at Camps Hills and Stewart, near Newport News, Va. The Norfolk sale will include the Reo, Kissel, Studebaker, Paige and Ford cars; thirty-three trucks of various sizes and types, among which will be Pierce-Arrows, Maxwells, Studebakers, Nashes, Reos and Fords, and two motorcycles. The sales at Camps Hill and Stewart will include twenty-five cars, consisting of Chalmers, Studebakers, Oldsmobiles, Maxwells, Buicks, Reos, Oaklands, Overlands, and Fords; seventy-four trucks ranging from light deliveries to 5-ton types and consisting of Oldsmobiles, Nashes, Pierce-Arrows, Buicks, Republics, Fords.

One 2-ton truck will be auctioned at Camp May, N. J., Sept. 18, one Ford car at Omaha, Neb., on Sept. 19.

Many other sales have been arranged at many army camps throughout the country, the numbers of cars to be offered varying. Information concerning them can be obtained from the Motor Transport Corps at the camps.

FIGURES OUT ON CAR SHIPMENT

New York, Sept. 13—Reports showing the increased shipments of passenger cars and trucks during July and August, over the corresponding period of last year, were made public to-day by the traffic division of the National Automobile Chamber of Commerce. Shipments of 24,897 carloads of cars in July this year compared with 13,741 in the same month a year ago were shown. The August figures, while incomplete, were announced as

indicating a total of 21,000 carloads this year, in contrast to 13,868 in 1918.

Driveaways from the factories are assuming large proportions at the present time, the report gave out, although there was little change in the situation in regard to freight cars. That a shortage was feared was indicated in the statement that the regional director of the railroad administration was co-operating with the Detroit office of the organization in an effort to keep up deliveries.

DES MOINES TRUCK TOUR OCT. 16

Des Moines, Iowa, Sept. 12—The Des Moines Motor Truck Dealers' Association has set the week of Oct. 16 as the dates for its first Des Moines Motor Truck Trade Tour. According to present plans, the tour will be on six days and will visit approximately twenty-five of the principal cities within the Des Moines trade area and many more

smaller towns. It is planned to run about 75 miles a day, covering 450 miles in all. A. H. Kroh, who managed the National Truck Development Tour, will manage the local tour, and L. H. Boydston has been asked to be tourmaster.

The truck dealers' association is receiving close co-operation in plans for the tour from the Des Moines chamber of commerce, the Des Moines Auto Dealers' Association and the Iowa Motor Trades Bureau. James B. Weaver, president of the Des Moines chamber of commerce, is planning to go with the tour. Pathfinders for the tour will be C. O. Hart, chairman of the Des Moines Motor Trades Bureau; Dean Schooler, president of the dealers' association; A. J. Knapp, secretary of the Iowa Motor Trades Bureau; R. H. Faxon, secretary of the Des Moines chamber of commerce, and Don T. Chamberlain, secretary of the truck dealers' association.

Army Motors to be Sold

	Ford Cars	Miscellaneous Cars	Ambulances	Delivery Trucks	2-ton Trucks	Nash Trucks	Miscellaneous Trucks	Motorcycles	Extra Sidecars	Bicycles	Total
Biltmore, N. C. Car.....							1	2			3
Camp Bowie, Ft. Worth, Tex.	3		1	2	14		30				50
New York, 461 8th Ave....		2									2
Call Field, Wichita Falls, Tex.	4	2		3	1						10
Camp May, N. J.....					1						1
Denbigh, Va.....		1									1
Camp Devens, Mass.....	22	20		6	17		1				66
Fort Washington, Md....		1									1
Camp Funston, Kan.....			1	22				27		18	68
Girtnier Field, La.....	1	2		2	1						6
Camp Holabird, Md.....	7	51		5	93	99	27	8	5		295
Camp Jackson, S. C.....	8	4		6	12	22		10			62
Camp Kearney, Cal.....	3	1		3	9	2	3	12	5		338
Little Rock, Ark.....		1									1
Los Angeles, Cal.....		1									1
Camp McClellan, Ala.....	4	2		10	42	4	12				74
McCook Field, Dayton, Ohio	1										1
March Field, Riverside, Cal				6	6						12
Camp Meade, Md.....	10			8	35	9	1	21			84
Montgomery, Ala.....	3	1	1	4				8			17
Newport News, Va.....	10	15		13	54	7	21	6	3		129
Norfolk, Va.....	2	5		2	16	1	5	2			33
Camp Normoyer, Tex.....		2		2	1		1				6
Omaha, Neb.....	1										1
Oteen, N. C.....							11				11
Philadelphia, Pa.....	9	9		9	18		71	3			110
Camp Pike, Ark.....					2		5	1			8
Riverside, Cal.....	6										6
Rock Island Arsenal, Ill..					2		1				3
Rockwell Field, Cal.....		1									1
San Diego, Cal.....	1		1		1		3				6
San Francisco, Cal.....								3			3
Selfridge Field, Mich.....		1		2	5	4			9		21
Camp Sevier, S. C.....		1									1
Camp Shelby, Miss.....	3	3			6	3	17	27		10	69
Speedway, Indianapolis...	3										3
Camp Stewart, Va.....		5									5
Taylor Field, Ala.....	1	2	1	10	2		3				19
Camp Travis, Tex.....	2	2		2							6
Total	104	135	5	117	338	151	213	130	22	28	1243

Milwaukee Show Sets Pace

Big Dealer Event Featured by New Offerings—Several General Motors Products Make Debut—Distributors and Factory Get Together

MILWAUKEE, WIS., Sept. 15—The annual fall show held in connection with the state fair September 8-13 proved to be an event of real moment, as it came at a time when the industries are just getting their wind after a lull in placing the entire power of the automotive business behind the effort to win the war. For more than six months Wisconsin, like all other states, has demanded twice as many cars as the factories of America were able to produce. It would have made the heart glad of every manufacturer of cars to watch the actions and divine the thoughts of the multitude which daily jammed Motor hall at State Fair park to inspect the show and keep on inquiring anxiously and almost with trepidation, "When can we get our car?" If the price, or the war tax, entered as a consideration, it was not apparent.

This year's state fair show, which is the real Wisconsin show of the year, as distinguished from the winter show in the Auditorium downtown, was one of the most important features of a great agricultural exposition. Like the winter or annual show, the fall show is managed and conducted directly by the Milwaukee Automobile Dealers, Inc., which leases the Motor hall and necessary adjoining space for temporary structures to accommodate the overflow, from the state fair management, which is the State Department of Agriculture. The M. A. D. attends to all other details, such as disposing of and allotting exhibit space, decorations, etc. The M. A. D. is privileged also to charge a nominal admission fee of 10 cents to the Motor Hall building, both to keep out the undesirable elements and to provide a revenue, although the latter is the minor consideration.

Tent Used Also

In Motor hall, and the annex consisting of a huge circus tent required to relieve the congestion, all passenger and commercial car exhibits are concentrated. Tractors are accommodated with the farm implement and power machinery exhibits a short distance away. The tractor and implement department as yet is directly under state fair board management, but its importance is growing to the point where similar provision for permanent structures as for cars and trucks must be made.

Motor hall and the canvas annex contained exhibits presenting fifty-eight makes of cars; thirty-six makes of commercial vehicles; two makes of trailers, and sixty-five displays of automotive equipment. The permanent building is 150 by 350 ft. and the tented annex had an area of 100 by 250 ft., giving a total floor space of 77,500 sq. ft., virtually

crammed with exhibits. In the six days that the show was open to the public, more than 185,000 persons entered it.

The fall show at the state fair is one of three main expositional events on the calendar of the M. A. D. The oldest is the winter show. Next comes the fair show, and third is the so-called spring opening in the latter part of April. Each has a distinct purpose, although the general purposes are interrelated. The three events form the principal joint selling effort of the trade in Milwaukee, Wisconsin, and Upper Michigan, which constitutes the territory of nearly all members of the M. A. D., who are distributors as

Industry Pays \$17,915,510 in Excise Taxes

WASHINGTON, Sept. 12 — Excise taxes paid by manufacturers on the sale of cars and motorcycles for the fiscal year ended June 30 totaled \$17,915,510.81, according to a report made public to-day by the Internal Revenue Collector. Commercial car taxes total for the same period and the revenue derived from taxes on tires, parts and accessories amounted to \$4,908,276.18.

Taxes received in the four months March 1 to June 30, 1919, from passenger cars for hire totaled \$507,721.01. Excise taxes received by the Department of Internal Revenue for the four months ended June 30, 1919, including all taxes paid on the revenue laws of 1917, 1918 and 1919, totaled \$29,262,864.79.

a rule but at the same time retail dealers in Milwaukee and immediate vicinity. While both fall and midwinter shows are generously profitable in a retail way, the state fair exposition has come to be primarily a distributor's opportunity to get into close contact with the dealers of Wisconsin and the Peninsula, and secondarily a retail harvest at the waning of the big touring season, both for the Milwaukee dealers as such, and the up-state dealers who bring to the fair or meet them there many prospective buyers from their respective localities. At the winter show, the dealer angle likewise is a big one, but this is more of a retail proposition, with a general purpose to stimulate interest in motor vehicles when the thoughts of the public are usually at the same low or off-peak point as the thermometer's mercury itself. The spring opening is purely a local retail affair, but it has the good influence of awakening the dealers and consumers throughout the state by the general publicity it produces.

The Overland Wisconsin Co., Wisconsin Oakland Co., March Motors Co., Mitchell distributor, Ford Motor Co. and

several other large wholesalers also entertained dealers at dinners, followed by trade conferences. These round tables were of unusual importance this year because of the big problems which doubtless will be confronted by the trade and industry during the coming year. With production now coming to normal and provision being made by all factories for greatly increased output, the distribution of the product is expected to require much more and closer attention and harder promotion than since the end of the war, when a seller's market has obtained consistently. Merchandising methods doubtless will have to undergo important changes for proper distribution and marketing of the huge output that is to come, in the event that economic developments change the entire complexion of the market.

Truck Was Featured

Stress was placed on the truck at this year's fall show. The principal purpose of this big effort was to sell the farmer more thoroughly. At the same time the necessity of selling the truck idea to the smaller business man is recognized. It has not been so easy to merchandise the truck as it has been to market the car output since the cessation of hostilities.

The feature of the truck sales effort was a ship-by-truck demonstration arranged under auspices of the M. A. D. and held Thursday afternoon. Approximately 200 trucks, new ones and those in hands of users, were marshalled for a parade which traversed the downtown streets shortly after noon and then proceeded to the state fair grounds at West Allis, 6 miles distant where the procession passed in review before the governor and other notables. The event was in charge of a sub-committee of the M. A. D. show committee and consisting of L. E. Steele, Firestone; P. E. Scibold, Goodyear; W. H. Reese, Sterling; F. R. Robinson, Packard; George J. Suess, Kissel; M. D. Newald, Stewart, and Ray Osborne, Nash. The Mitchell factory band headed the parade.

New offerings of several factories excited wide interest at the fall show. These included the new Overland four; the Cleveland six, and a brand new design emanating from General Motors and called the Samson nine-passenger carryall. This car will list at \$750 and will be put in production at Janesville, Wis., through the Samson tractor division.

General Motors also exhibited a new $\frac{3}{4}$ -ton and $1\frac{1}{4}$ -ton truck and the Samson Iron Horse, a combination tractor design, in addition to the model M Samson tractor already in quantity production at Janesville. The carryall, trucks, Iron Horse and tractor all bear the Sam-

son trademark and will issue from the new Janesville works.

Another of the General Motors products to make its first showing at Milwaukee is the Sunnyhome electric light and power plant, of the Sunnyhome Electric Co., Detroit, a division of the General Motors Corp. This outfit is a complete little powerplant which is housed in its own little power house in the farmer's yard. It is 110-volt, with automatic control. The exhibit of Sunnyhome plant and appliances in a special exhibit building was one of the features of the show.

Demand Half Filled

At the close of the show Saturday afternoon, it was the opinion of Milwaukee distributors, gained from conferences with dealers and sub-dealers, that the 1919 car market of Wisconsin and Upper Michigan was about 50 per cent satisfied up to Sept. 1. Wisconsin's registration up to that date was 244,500 cars, 54,000 more than were registered throughout 1918. This does not include trucks and represents only cars in private owners' hands. While the absorp-

Another electric plant to make its first public appearance is the Willys, one of the products of John N. Willys. This was exhibited in a special building which represented a farm cottage, completely electrified.

tion of 54,000 cars is a remarkable achievement for Wisconsin, the consensus is 100,000 cars could be marketed in this state this year if the factories could furnish them.

Discussions at the show revealed a healthy demand for trucks in all sections of the state and more interest from farmers. The tractor situation is regarded as satisfactory and the outlook excellent. It is believed also there will be no difficulty in marketing all the tractors allotted to this territory between now and next fall. The experience of farmers with tractors is so satisfactory that it is stimulating a farm demand for trucks. With \$12,600,000 being expended for permanent highways in Wisconsin this year and \$18,000,000 to be invested in 1920, the farms of the state become a market for trucks of almost equal importance with cars.

It is only five years since the M. A. D. set out to build up a real automotive show at the fair. Prior to 1915, car, truck and the sprinkling of tractors in that day were scattered indiscriminately over the west section of the park. In 1914 the fair management had constructed a gaunt concrete building resembling a huge shed, consisting of a series of concrete pillars supporting a concrete roof. It was labeled Machinery hall and had no walls because it was

meant to accommodate anything that savored of machinery—farm implements as well as motor vehicles.

The M. A. D. secured permission to close up the sides and ends with steel sash walls and made the shed a handsome exposition hall which could be kept clean and tidy and to all intents and purposes is as substantial and fireproof as the Auditorium downtown. The M. A. D. leased the building at a lump rental and sold space to its members and other dealers, reserving the building to cars, trucks and automotive equipment. By 1916 it was found necessary to make temporary provision with tents for accommodating overflow. Only the intervention of war prevented the erection of a permanent addition to the main hall, but this will be done during 1920, the association is assured.

Sets Pace for Others

Thus, out of a smattering of exhibits, the M. A. D. created a well organized, efficient and representative fall show, which set the pace for other states and still provides new ideas for those fairs which adopted the original idea. Credit for the project rests largely with Bart J. Ruddle, assistant secretary and manager of the M. A. D. This year's show committee consists of L. D. Frint, chairman; John E. Nelson and H. P. Carter.

Production of Crude Oil Shows Increase

Gasoline Output First Six Months of This Year Was 5,000,000 Barrels More

WASHINGTON, Sept. 11—Production of crude oil for the first six months of 1919 indicates a greater production for this year than last, according to figures furnished the United States Geological Survey. For the first six months of 1918 it was 172,000,000 bbl. compared with 177,000,000 bbl. in the first six months of 1919, an increase of 5,000,000 bbl.

Storage of domestic crude petroleum, which showed gradual decline in 1918, when 20,000,000 bbl. were withdrawn from storage, has reversed its position and in 1919 there has been an increase of storage of 8,000,000 bbl. and on June 30, 1919, the total reserve approximated 136,000,000 bbl.

Gasoline production has increased while exports have decreased. In the first six months of 1919, 237,000,000 gal. more of gasoline were produced than in the first six months of 1918, according to figures from the Bureau of Mines. At the same time exports decreased by 98,000,000 gal., due to the cessation of hostilities. In the first half of 1919, 3,000,000 gal. more of gasoline were exported to the insular possessions of the United States than in 1918, due to the release of tankers for domestic trade. Domestic demand for gasoline has been 42,000,000 gal. greater in the first half of this year than in the first half of 1918. It is expected that with the increasing use and number of cars, tractors and trucks, the

demand for gasoline will continue to increase.

The seasonal demands for gasoline are shown by a review of the amount of gasoline in storage. On June 30, 1918, there were 418,000,000 gal. of gasoline in storage. This was reduced by Dec. 31, 1918, to 297,000,000 gal. but in the winter months the stocks built up until on June 30, 1919, there was approximately 594,000,000 gal. of gasoline in storage.

Refinery statistics disclose that 223,000,000 gal. more of kerosene were exported in the first six months of 1919 than in a similar term of 1918. This is probably accounted for by the release of tankers from war duty.

Kerosene Stocks Lowered

Stocks of kerosene from June 30, 1918, to June 30, 1919, were reduced from 426,000,000 gal. to 252,000,000 gal., a reduction of 174,000,000 gal. Stocks of kerosene have been on a constant decline for the last year and a half, and this in spite of the fact that in the first six months of 1919 production of kerosene increased 188,000,000 gal. over the same part of 1918. Kerosene is used largely for illuminating purposes and the greatest market is in the Orient and in South American countries.

Upon the signing of the armistice there was a remarkable decrease in the activity on the part of the Allied fleets,

which has resulted in less demand for fuel oil. This resulted in flooding the fuel oil market which is to-day temporarily easy. Refinery statistics show for the first six months an increase in production from refineries of 107,000,000 gals.; exports decreased by approximately 213,000,000 gal.; domestic consumption increased only 83,000,000 gal. and shipments to insular possessions increased from 2,000,000 to 58,000,000 gal. The stock of fuel and gas oil at the refineries for June 30, 1919, showed an increase over June 30, 1918, of 261,000,000 gal.

It is probable the present fuel oil surplus is temporary and in from two to five years fuel oil will be in great demand. This is because the Navy is converting its coal-burning ships to oil-burners and if the plans of our contemplated merchant marine are developed, there will be a large increase in the annual consumption of fuel oil.

The lubricating oil output for the first six months of 1918 and for a similar period in 1919 is about the same, amounting to approximately 409,000,000 gal. but with a decrease of 20,000,000 gal. in the domestic consumption for the first half of this year, possibly due to the large munition plants closing down, and that during the first half of this year, the nation was not entirely converted from a war to a peace basis.

For New Insurance Basis

Organizations May Change Rating After First of Year and Classify Cars

Would Submit Machine to Underwriting Laboratory

NEW YORK, Sept. 12—Studies looking to new rating bases for motor insurance after Jan. 1, 1920, are being made by the Society of Automotive Industries, the National Automobile Chamber of Commerce and the Underwriters' Laboratories of Chicago. The research work contemplates that each manufacturer submit his car to the underwriting laboratory for review and classification, arrangements for which have been made by the N. A. C. C. The present practice of basing rates will continue after that date on cars produced up to Jan. 1, as the changes will apply only to cars made after that date.

The basis for fire insurance has been divided into seven groups, each of which has a definite value on a total of 1000 points. These groups, which follow, are further divided into many sub-groups, the determination of each of which will require individuals study of the cars.

	Points
Fuel Hazard	300
Electrical	300
Type of feed	200
Heat and flame	100
Carburetion	50
Feed line and accessories	25
Miscellaneous	25

Group divisions also have been made concerning protection from collision and protection from theft. Further studies will be made before the new rates can be fixed.

ROST ORGANIZES SALES COMPANY

New York, Sept. 15—N. G. Rost, general sales manager of Duesenberg since its organization in 1916, has resigned and has organized a sales company to represent several automotive manufacturers. The new concern will have headquarters in New York with a branch office in Detroit. Prior to 1916 Mr. Rost was sales manager of the Loew Victor Engine Co., Chicago, which was the predecessor of the Duesenberg corporation.

WHY THEFT LAW IS NEEDED

St. Louis, Mo., Sept. 12—Harry G. Moock, business manager, and C. A. Vane, attorney for the National Automobile Dealers' Association, are in Washington to confer with Representative L. C. Dyer of St. Louis concerning the bill introduced by Dyer to punish interstate thefts of motor cars. Dyer reports that he has been progressing splendidly, and he thinks the bill will be written into law before many months.

The necessity for such a law is shown clearly in a report to the association by the American Automobile Insurance Co. writing theft insurance in twenty-two states, as a critical situation existing be-

tween Memphis, Tenn., and several northern Mississippi counties. The Memphis chief of detectives and his aid came very near being lynched. An agent for the insurance company located twenty-five or thirty stolen Ford cars in Mississippi and brought back four of them. The agent accompanied by Detective Bell of Memphis, went to Senatobia, Miss., to recover a stolen car.

"As to getting co-operation," the agent writes, "it is impossible. The sheriff refuses to do anything, stating that he is tied up in politics and that he has a wife and children and that he has been threatened, in fact, someone fired a shot at him. He showed us a bullet hole through his hat. The mayor refuses to do anything. There are a couple of constables there, but they say they have nothing to do with the motor car stealing and do not intend to get mixed up in it."

TRUCK MEN HAVE OUTING

St. Louis, Mo., Sept. 13—The first of a series of "parties" to bring the production and sales departments into closer co-operation was given by the Traffic Motor Truck Corp. last week, when all employees were guests of Vice-President T. C. Brandle on an evening boat ride on the steamer St. Paul. It was a big family party, with everything free on the boat from ride to refreshments, including cabaret and dancing. Wives and sweethearts took part in many contests.

The boat ride also marked the close of the convention of salesmen held the first three days of the week. At the convention announcement was made of the winners in a sales contest known as the Traffic sales flight, taking the form of a transatlantic flight and following the route of the NC-4 from New York to Plymouth, England. The flight started in June and ended Sept. 1. An airplane was assigned each salesman, and the distance covered set at 1000 points, retail dealers' contracts counting so many points. H. O. Yowell of North Carolina was first with B. A. Ballou, sales representative in Missouri, second, and S. T. Strong of Illinois third.

U. S. RUBBER STOCK INCREASE IS RATIFIED

New York, Sept. 13—Stockholders of the United States Rubber Co. meeting at New Brunswick, N. J., have ratified the proposal of the directors that the capital stock of the company be increased to \$300,000,000. This plan calls for an increase of the first preferred stock from \$70,000,000 to \$100,000,000, and of the common stock from \$36,000,000 to \$200,000,000. The entire issue of second preferred stock, the authorized extent of which was \$10,000,000, but which has been cut down to a nominal amount, will be retired. The holders of common stock will be offered \$36,000,000 at par, of the new common issue, according to the action of the stockholders.

Car Paper Rated Higher

Federal Reserve Bank Defines Financial Status at Request of N. A. C. C.

Draft Secured by Bill of Lading Eligible for Acceptance

NEW YORK, Sept. 9—A ruling which gives a higher rating to motor car paper has just been announced by W. P. F. Harding, governor of the Federal Reserve Bank, in a communication to the National Automobile Chamber of Commerce. The decision came as a result of the attempts of the N. A. C. C. to have cars defined as "readily marketable staples" by the reserve board. The attempt was unsuccessful but in the opinion of officials of the N. A. C. C., such paper is given a better standing. The definition of "readily marketable staples" was given by the board July 1 thus:

"A readily marketable staple may be defined as an article of commerce, agriculture or industry of such uses as to make it the subject of constant dealings in ready markets with such frequent quotations of prices as to make, (a), the price easily and definitely ascertainable, and, (b), the staple itself easy to realize upon by sale at any time."

Governor Harding's decision gives the following opinion on motor papers.

"The board is of the opinion that the term 'readily marketable staples' does not include automobiles. If, however, the seller of goods—not necessarily limited to readily marketable staples—ships those goods to a buyer who arranges a bankers' acceptance credit, a draft drawn by the seller on the buyer's bank and accepted by that bank comes within the terms of the section, provided that the shipping documents covering these goods are attached. For the purpose of this part of the section, there is no doubt that automobiles are goods and that an acceptance of this character, that is, a draft secured at the time of acceptance by a bill of lading covering automobiles in transit, is eligible for acceptance by a national bank under the terms of the law, provided, of course, that it complies with other provisions of the Federal Reserve Act and the board's regulations."

CENTRAL SALESROOM A SUCCESS

Chicago, Sept. 12—Impetus to the move for more centrally located motor car retail districts has been given by the success of the first venture in this direction in Chicago. Thomas J. Hay, distributor for the Cleveland, who opened the first establishment of this sort on the new and uncompleted boulevard link last week reports such success that his example in moving to the central business district may be followed by many others within the next few months.

Rentals on the boulevard link are considerably higher per foot than in the dis-

trict now occupied by Chicago's motor car dealers but figured on the basis of cost per prospect reached they figure lower. It is estimated that less than 33 per cent of the motor cars in Chicago pass the old location, while experts believe that when all work has been completed on the link, approximately 70 per cent will pass over it at least two or three times a week. In addition, the new location is only two blocks from the most central retail business district of the city.

Solution of the high rentals and limited space on the link may come through the separation of the sales and service rooms. While some distributors probably will continue to house these two departments under the same roof, the growing tendency in larger cities where high rents prevail seems, to be toward the maintenance of a small salesroom and immediate service shop in the high rental district with the main service station for major repairs and overhauling in districts where the rent is lower.

MILLER ISSUES \$800,000 STOCK

Akron, Ohio, Sept. 14—An increase of \$800,000 in capital common stock of the Miller Rubber Co. was announced to stockholders this week. Holders will be permitted to subscribe to the new issue at \$100 par on the basis of a fifth of their holdings. The stock has been selling at better than 200 for several months.

Increase of sales for the first seven months of 1919 by approximately 56 per cent over the same term for last year is the reason assigned for the issue. The company did a business of \$16,000,000 in 1918 and set a figure of \$23,000,000 for this year. It is expected this figure will be surpassed by a considerable margin.

FIRST GARDNER CAR NEXT MONTH

St. Louis, Mo., Sept. 12—The Gardner Motor Co., which will build the Gardner car here, expects to have its first completed car on exhibition in October. Russell D. Gardner, sales manager, says the company will begin production in January and inquiries have been received from foreign sources for the new car and plans are being worked out to use the Mississippi river in making these export shipments.

VINCENT NOW A COLONEL

Detroit, Sept. 12—J. G. Vincent, vice-president of engineering of the Packard Motor Car Co. and co-designer of the Liberty aircraft engine, has been commissioned a colonel in the Officers' Reserve Corps. The appointment is to the aviation section of the Signal Corps and specifies a flying status.

HUPP SURPLUS FOR YEAR

Detroit, Sept. 12—In its annual report for the year, ended June 30, 1919, the Hupp Motor Car Corp. shows a surplus of \$456,572 after preferred dividends were paid as compared with \$745,138 for the preceding year. Net profits were \$535,602 as compared with \$836,691 for the preceding year.

Makers Urge Driveaway

Inability to Get Enough Freight Cars at Detroit Results in Overland Deliveries

Shortage Due to Heavy Crop Movement in West

DETROIT, Sept. 12—Detroit car and truck manufacturers are urging dealers to drive away their cars. This is due to impossibility of securing sufficient freight cars, the shortage of which is becoming more and more pronounced. While Toledo and Cleveland plants are encountering similar transportation difficulties, the car shortage there is not as acutely felt as in Detroit.

During the last two months hundreds of machines have been driven away, some of the driveaways going as far west as Arizona and New Mexico. Cars are being driven to virtually every Eastern and Southern state. Many Ohio, Indiana and Illinois dealers are insuring prompt delivery by coming to the factories for their cars.

Local railway freight offices say the shortage of freight cars is due to the heavy crop movement in the West. They also declare that under Government management, rolling stock which has been scrapped has not been replaced.

The policy of the manufacturers since the signing of the armistice has been to discourage driveaways. Cars driven 1000 miles or more before being placed on sale are practically second-hand cars. Repairs necessary to offset the road wear on driveaway cars cut into the dealer's profits. It is often necessary to refinish these cars, especially if rainy weather and muddy roads are encountered.

Now, however, the freight car shortage is forcing makers to revert to their wartime driveaway policy. In the last two months approximately 50 per cent of all Hupmobile deliveries have been driveaways. Columbia has sent cars overland as far west as Tulsa, Okla., and on one occasion two cars were driven to San Francisco, Cal. Paige-Detroit cannot get freight cars and is shipping overland.

Hudson recently staged the largest driveaway in its history, 150 cars being driven away by the Hudson Motor Car Co. of Illinois. The same day the Walter Bemb Motor Car Co., Detroit distributor for the Hudson and Essex lines, drove 100 cars to various parts of Michigan. Hudson is shipping many motor cars on flat cars after securely boxing them in. This company has sent cars overland to San Francisco, while the Atlanta, Ga., distributor has made several driveaways this year. Buick and Dort also are making driveway deliveries.

SAXON REDUCES ITS DEBT

Detroit, Sept. 12—Saxon has retired 30 per cent of its outstanding indebtedness with money received from General Motors through the sale of the new man-

ufacturing plant built prior to the war but never used.

The 30 per cent payment was made Sept. 3. Aug. 1 a payment of 20 per cent was made. These two payments have reduced the original Saxon indebtedness approximately 48 per cent. In May the outstanding indebtedness totaled approximately \$2,500,000.

With the continuance of excellent business and the extension of credit the company has been able to obtain, it is beginning to appear as if Saxon will be able to solve its financial problem without reorganization. This plan has been held in abeyance by the board of control pending the outcome of business developments, and it is now stated that if reorganization should become necessary, the plan will be greatly modified.

HAYNES PLANS EXPANSION

Kokomo, Ind., Sept. 12—The Haynes Automobile Co. will increase the capacity output of its plant to 15,000 cars annually. To make this expansion possible the directors have voted to construct a new factory and a forgeshop and to increase the capital stock from \$3,500,000 to \$5,000,000.

The new factory will be 500 ft. by 150 ft. and four stories high, making an additional factory space of 320,000 sq. ft. It will be used for assembling, trimming, painting and storage. The new forge shop will have a floor space of 12,000 sq. ft. A 700-hp. plant will heat the new buildings. Work on the new buildings will start immediately, and it is expected they will be completed early this fall.

The progressive system of manufacturing will be adopted throughout. Several hundred thousand dollars will be spent on machinery and equipment. It is estimated the normal output of the enlarged factory will be fifty cars a day.

A. G. Seiberling, general manager of the company, was elected second vice-president. March Haynes, son of Elwood Haynes, president of the company, was made assistant treasurer and secretary.

TISCH ENTERS RETAIL FIELD

Detroit, Sept. 12—A. L. Tisch, advertising manager of Paige-Detroit, has resigned, terminating a connection in effect for six years.

Mr. Tisch has been at the head of the advertising department for the six best years of Paige development and success. After eleven years in the manufacturing end of the industry with Paige, Haynes and others, he is branching off into the retail end of the business, having made a connection with the Robb Motor Car Co., Chicago, in an executive capacity.

INCORPORATE CARBURETOR COMPANY

Chicago, Sept. 12—The Master Sales Corp. has been incorporated for \$20,000, to distribute Master carburetors in Illinois, Indiana and Iowa, with headquarters at Chicago. Officers are: William Tesnow, president; C. J. Abbott, vice-president and sales manager; Edward J. Morse, secretary and engineer, and A. T. Herman, treasurer.

CAR RECORD										No.	Date	19
X Car on Floor V Car off Floor U Car Repair Delayed O. K. Accepted S Service Job										S. C. Service Cash R. Rejected		
Customer's Name	Car No.	Disposition	Date Promised	Tester's Report	REPAIRS SEE MASTER SHEET	Chassis	Motor	Electrical	Transmission	Delivery		
John Jones	148230	14	9/18/19	P-29-19 OK	Motor Elec. Trans.	Chassis Motor Electrical	Chassis Motor Electrical	Chassis Motor Electrical	Chassis Motor Electrical	1919		

Here is the car record sheet which the Larson-Oldsmobile Co. of Philadelphia has added to its master sheet system

Car Record Joins Master Sheet

Larson-Oldsmobile Adds Form to Supplement System Already in Use

AN improved car record sheet has been put into operation recently by the Larson-Oldsmobile Co., Philadelphia, Pa., in its service department. James K. Mogee, service manager and general superintendent, evolved the form, a sheet 17 in. wide by 22 in. long, divided into twenty-one columns and twenty-seven lines. It was designed after careful study of various car record sheets recording time of entry and exit of cars taken in for repairs. None of these, however, offered any satisfactory method of ascertaining, if immediate demand for information arose, in just what department or in what condition the vehicle in question might be.

This new form of car record is adapted especially to the needs of a large organization, where there are many departments and numerous floors, although its general principles could be applied advantageously to any repair business of several departments where the adjustment of the vehicle goes through various processes.

The form is arranged to dovetail with the master sheet system in use in the Larson-Oldsmobile service department, reproduced in Motor Age recently, whereby numbers indicate repair items, the car, for instance, being separated into eight units, or grand divisions, for convenience in recording.

Filing Record Sheet

Each car record sheet has a number under which it is filed, and each sheet is dated, as the forms are made out daily. Three columns in the center of the form indicate the repair classifications, after which the master sheet number is written according to the nature of the repair to be made. These column classifications are grouped as follows:

Motor	Universals
Electrical	Differential
System	Steering Gear
Transmission	Chassis
& Clutch	Miscellaneous
	Accident

These constitute the original eight grand divisions of the master sheet with a ninth, "Accident," added for the purpose of the new card record sheet.

The other columns are as follows: Customer's Name, Car Number, Inspector's Number, Disposition, Date Promised, Tester's Number, Report, Delay Sheet Number, Outside, B. 1, 2, 3, 4, 5, 6, 7 and Delivery.

That operating the car record sheet may be learned easily and that the operator may never go wrong with his entries, on the upper left corner of the sheet is printed an explanation of the abbreviated markings to be filled in the proper spaces.

For instance "X" after an entry means "car is on floor," the entry being made under the number of the floor, thus indicating just where the car is to be found. It will be noted that there are seven numbers at the right side of the form, preceded by the letter B. In the case of the Larson-Oldsmobile building there are seven floors and a basement, the letter and numbers indicating it. So if under the number "4" an "X" is entered, it means the car about which information is sought is on the fourth floor and if an "X" appearing under "B" it means the car is now in the basement.

In the same manner, the marking "V" means "car has left floor." So, when the entries "XV" appear opposite the customer's car in the proper space on that line, it means "car has been on this floor and left."

The other marking explanations are as follows: "O" means repair job delayed; "S" means it is a service job; "SC" means service cash job; "R" signifies "rejected" and "OK" accepted.

The car record sheet is kept by a tracer clerk in the service station office on the first floor. He has it constantly in front of him for reference in case of telephone calls from customers or service manager, asking specific information about any car, or in case of a "stop-in" by a customer or his chauffeur. The operation of the sheet is such that by merely glancing at it, the clerk can tell:

- 1—When the car was brought in.
- 2—In what departments it has passed through.
- 3—Just what has been done on it.
- 4—Where it is now.
- 5—If any delay has been, or still is necessary.
- 6—What the tester and inspector have discovered about it.
- 7—What its general condition is.
- 8—When it will be delivered.

Work orders of the Larson-Oldsmobile Co. are being made out on the first floor only. When a job comes in for repair, if it is only a slight service one, entry

is made as of the first floor, but if it is a long or repair job which means it must go to the shop, entry is made as of the fourth floor, where the repair shop is located. If a shop job, the work order number will be entered in the column headed "Disposition."

Suppose John Jones, customer, sends in his car for a regular repair job, destined for the shop. The tracer clerk enters on the car record sheet in the allotted spaces Jones' name, the number of his car, which, say, is 148230, the inspector's number, which, say, is 14, the date the car is promised for delivery, and what is to be done on the car. The inspector finds, for instance, that under the grand division "Motor" the stems are to be trued, the valves turned and ground and the seats reamed; under the grand division "Steering Gear" the gearing is to be adjusted and lubricated. He makes the respective entries after each, "2" and "1," as these numbers on the master sheet indicate these items of work. An entry is made under "Disposition," by work order number, which in this case will be called "1898."

Miscellaneous Entries

Under the grand division "Miscellaneous," let us say, the inspector makes the entries "12" and "4." This means, according to the corresponding numbers on the master sheet, that the car is to be repainted and a new light put in the rear curtain. Should a fender need refixing, a corresponding entry would be made.

As soon as the car is sent by elevator to the fourth floor, the tracer clerk makes the entry in the column headed "4," on the line with the customer's name and other entries. This entry, as already mentioned, is "X." As soon as the work in the shop proper has been finished and the car is ready to leave the floor to go to the seventh floor, the trimming and upholstering department, where the new light is to be put in the rear curtain, the shop foreman telephones to the tracer clerk that information. The clerk immediately places the entry "V," meaning "car has left floor," after the "X" in the column headed "4."

On the car's arrival in the trimming department, a telephone message from the foreman there is followed by the tracer clerk's entry of the mark "X" in

the column headed "7." This process of telephoning and entering is repeated when the car leaves the trimming section for the paintshop. The paintshop being on the sixth floor, the proper entries, of course, are made in the column headed "6."

When everything ordered has been done on the car, it is returned to first floor, the proper entries being made in the same manner. The next step is to assign a tester to the job of trying out the car before delivery. The tester's number is indicated—let it be 12—in the column devoted to such entries and under the heading "Report" is entered either "R," for rejected, or "OK" for accepted by him.

How Record Is Kept

The car has been promised, for instance, Aug. 29, so entry to that effect already has been made under "Date Promised." But the car is, say, ready ahead of time, and OK'd by the tester, so it leaves the first floor as the tracer clerk checks it off with a "V" after the "X" for its arrival there, and it is stored temporarily, out of the way, in the basement until date for delivery. When it

arrives in the basement, it is checked up, as usual, by the telephone-and-entry method, but under "B." If the car, for instance, has to be returned to a department, the checking of departure and arrival is repeated.

If some outside work on the car has had to be done—and there are certain jobs not done in the Larson-Oldsmobile shop—proper entry is made in the column provided, headed "Outside." When the car is delivered, date and hour of delivery are entered in the column headed "Delivery."

Reference to the car record sheet will show a column headed "Delay Sheet Number." This is explained by the fact that a special single delay sheet, a replica of the car record sheet, is kept separately and numbered. The plan is to have such a sheet to which to transfer jobs coming in too late to be entirely checked up as to entries before the end of the day, or jobs which have been delayed unavoidably. The use of such an arrangement enables each car record sheet to be closed daily, delayed jobs being transferred so as not to hold up the closing of the sheets.

So the number of the delay sheet to

which the delayed job is transferred is entered in the column on the car record sheet headed "Delay Sheet Number." This enables, through the numbering, the tracer clerk to pick out the delay sheet immediately, if wanted. The delay sheets are kept for a month or two, being filed separately from the car record sheets.

The new method, in the case of inquiries and complaints, has proved especially valuable to the company in the short time it has been in use, because it prevents the slightest delay in finding out everything desired by either customers or service department executives with regard to a car in process of repair.

Keeps Up With Cars

Prior to its use, because of the large size of the building, the various floors and departments and the time necessary to transport cars through the building, delays in finding out information needed instantaneously had proved more or less of an annoyance. But under the new plan service department and customer can be informed of the progress and condition of a car at any moment. The plan also presents handily the information required under the state code for garages to supply on demand.

Vesper Finds Pacific Coast Rushing Roads Gets in a Few Boosts for Highways Himself While on Western Trip

ST. LOUIS, MO., Sept. 12—"The Pacific Coast is positively mad over highways. No finer roads exist in the world. Highways in turn mean cars, as is shown by the fact that Los Angeles alone, with a population of 300,000, has 75,000 registered cars. One person out of four owns a car. The other three will be found in the back seat."

This is the message F. W. A. Vesper, president of the National Automobile Dealers' Association, brought back with him from the Pacific coast, where he spent six weeks. Three thousand miles of his trip through Washington, Oregon and California was by motor car.

Vesper Helps Road Work

One result of Mr. Vesper's trip to Los Angeles, San Diego and San Francisco will co-relate its expenditures with the Federal Government, "matching dollars" with the Federal Highway fund.

"In this way," he said, "a new \$40,000,000 bond issue will in reality result in the expenditure of \$80,000,000 for new roads. Many of the highways are built entirely under the direction of the state highway department, and with state money."

"The greatest investment that any state could make, as far as I know, will be to send its highway commission and its good roads opponents to the Pacific coast. No man could see those roads and return home unconvinced that highways are the greatest single factor now in a state's industrial and economic development."

Mr. Vesper was the guest of the Washington Automobile Trade Association and the principal speaker at its state convention in North Yakima, whence he drove to Seattle. At Portland and Seattle he spoke to the dealers' organizations and the Chambers of Commerce. He spoke to the dealers at San Francisco and San Diego, the latter association joining the national in a body. The other associations already were members of the National.

Mr. Vesper also drove from San Francisco to Los Angeles and San Diego. Because of the railroad strike in Southern California, he was forced to return by motor car to San Francisco after he already had made his reservations eastward from Los Angeles.

"The value of the motor car as a carrier was never better demonstrated than in this California rail strike," Mr. Vesper pointed out. "Between Los Angeles and San Francisco there is a wonderful highway. When the strike halted trains from Los Angeles thousands of persons used motor cars, trucks and buses and there was a steady stream of these vehicles between Los Angeles and San Francisco in both directions."

Mr. Vesper was impressed with the appeal California makes to the tourist trade. "Service stations and filling stations are everywhere," he said. "The cities do everything to make the visitor feel at home. Each city has a free tourist parking reserve, furnishing electric light, water and firewood free to the visitor."

According to Mr. Vesper, the dealers on the Coast are highly prosperous. While pinched on deliveries they are taking advantage of the situation to interest themselves in association work. Seattle and Portland dealers have live associations. The California Automobile Trade Association, of which Robert Martland is secretary, is a strong factor in legislation affecting the trade. The Southern California association also has done valuable work.

FREE LECTURES IN ST. LOUIS

St. Louis, Mo., Sept. 13—A series of six free lectures, starting Oct. 22 giving instruction in the operation of motor cars in the interest of public safety, will be given by the Central Mississippi Valley Division of the National Safety Council. One lecture will be given every two weeks. The subjects for the lecture are: Traffic Rules and Regulations, Mechanical Hazards and Efficient Driving; Hazards of the Streets; Accident Statistics and Reports; Safe Operation of Passenger Cars and Trucks; Qualifications of a Safe and Competent Chauffeur.

COOPER TAKES CURTISS AGENCY

San Francisco, Cal., Sept. 12—Earl Cooper, the racing driver, has organized the Earl P. Cooper Airplane Co. and will act as distributor for the Curtiss Aeroplane & Motor Corp. for Nevada and the northern half of California, with headquarters here. He plans a flying school and will operate several aerial transportation lines.

The Unsuccessful Dealer

Two Distinct Types: Prepared and Unprepared—A Matter of Publicity

THERE are, at present, two distinct types of unsuccessful dealers, prepared and unprepared. This may seem unusual but a general survey of all the dealers indicates that a great percentage are unsuccessful and a great number of the remainder, while they cannot be classed as unsuccessful, could do a bigger and better business than they are doing. Practically the same may be said of publicity as has been said of preparedness. When either preparedness or publicity are spoken of singly it should be understood that they should go together. Of what value is publicity if it brings the business and you are not prepared to handle it? Of what value is preparedness if you do not get the business? Either answer is none.

An excellent example of this was presented recently by two dealers who were interviewed as to their views on the success or failure of their business. These two dealers were neither successful nor unsuccessful. They were a medium, but each was a good example of failure which was derivative of too much time and attention having been given to preparedness or to publicity.

Plant Inspection a Pleasure

The first was an example of preparedness. He was doing a fair business but not half what he should or could be doing. An inspection of his plant would be a pleasure to anyone, not a single detail was overlooked in equipment, decorations, convenient arrangements or interior advertising. The appearance of the office was beyond reproach. It was business-like, to say the least. The salesroom was neat and immaculate. The accessory department was complete and properly arranged, and the service department was beyond criticism. All in all, the failure of this place was mysterious. Just why this man was not receiving more than his share of the business of his community was not immediately apparent to the observer because one need only step in through his door to be impressed with the caliber and character of the management. But that was the whole trouble, as further investigation revealed. One had to step in through his door to know what type of place he had. The person who once entered the office, the salesroom or, in fact, any one of the several departments would not hesitate to call again. But the trade was not coming in. As the dealer remarked,

"I have absolutely, the finest and best equipped garage in this part of the country, and yet the second-rate concerns are doing the business and getting the money." It was a fact, and it was discouraging.

"What seems to be the trouble," he was asked, "are you unable to keep your customers?"

"O, yes," he replied, "I have no trouble

in holding the trade I have, but the volume of business I am doing doesn't pay even the legal rate of interest on the investment."

He had said enough. There could be but one answer for the failure of such a concern and that was that he had given all his time and attention to preparedness and neglected to advertise. He had advertised on the inside but not on the outside. He had failed to invite the trade to inspect what he had prepared for them. This was evident in two ways, first, because he was not getting new business and second, because nobody, except his old trade, knew of him. It was not a hard task to show this man where the trouble existed. The publicity of his busy competitors, when pointed out to him, was all the evidence necessary to prove to him that all of his preparedness had been of little account. He has no reason to regret the time and attention required to make his institution the efficient place it is because, this must precede the publicity. His only regret is that he stopped when the job was half done.

This is the fault of a great many other dealers. They imagine that because their place is up to the minute in every detail on the inside that nothing more is necessary to gain the trade. The place is an advertisement in itself, but it is slow-spread. It claims and holds the confidence of the customers who are constantly coming in, but it is not on the job when it comes to attracting the public who have never been in the place. Prepare, but advertise your preparedness.

The other man interviewed was the manager of a garage which was constantly getting new customers but had hardly an old customer on the books. However, it was unnecessary to question this man as to the prevailing condition. The office was literally a rat's nest. Papers scattered here and there in the desk, on the desk and all around the desk. Magazines and all kinds of literature was strewn over a small table and on the window sills. A week's dirt on the floor and a heavy accumulation of dust on the shelves, showcases and everywhere. In fact, one could not take a seat in the office without danger of ruining his clothing, so greasy and dirty were the chairs.

Mismanaged Repairshop

To walk into the garage was a change but no relief. Bent and broken tin pails, oil-soaked rags, sections of raveled rope and sweepings were to be found almost everywhere. Finally, walking into the repairshop, the last department to be inspected, there was to be seen complete evidence of the most uncomplimentary remarks ever made of a mismanaged repairshop. The polarity of the old set rule, "have a place for everything and

everything in its place," was positively reversed in this shop. They had nothing; a place for nothing; and nothing in its place. There was no need for a dolly in the moving of rear ends. The oil on the floor served better. It may have been more of a question to stop a sliding article than to start it. Then the waterproof mechanics. Never heard of that term before? Ever wonder how long some mechanics could remain out in the rain before the water penetrated the grease-covered and oil-soaked uniforms they were wearing. Well, it couldn't be estimated here, because there was no certainty as to how much the thickness of the shell exceeded half an inch. It may be said that it is well enough for the critic to notice these things and tell us about it, but when one stops to consider that the customer is the most exacting critic of all critics, because it is he who must endure these irregularities, one does not wonder at such an establishment's failure.

How He Advertised

Stepping back to the office, the manager is found busily engaged in writing up an attractive half-page advertisement for the Sunday paper. He was so busy he found it convenient to excuse himself until he had finished his job.

"By George," he exclaimed as he finished, "I don't know how I'd keep going if it wasn't for this publicity stuff. If I stopped advertising for two weeks, I wouldn't have any more business than a jackrabbit. It seems the trade just waits to see what sort of publicity you're going to put out before they make a move to come at all, and then after one or two jobs that's the last of them."

"Well," he was immediately advised, "your statement is not to be doubted in the least. It is a wonder if they come more than once. There is every reason in the world for them coming the first time because your publicity is excellent—it is bound to bring them—but the trouble lies in the fact that you have not prepared for their coming. You have impressed them so highly in your publicity that they are extremely disappointed in the reception they receive. Imagine a person reading that ad you have just completed. What is the impression they receive from it? All that could be expected of the finest and best managed garages in the country. What is the reception upon their arrival? Dirty, deranged office; dirty and untidy garage; dirty and grease-laden mechanics to soil the car on the outside and inside, making it a fit subject for the dry-cleaners.

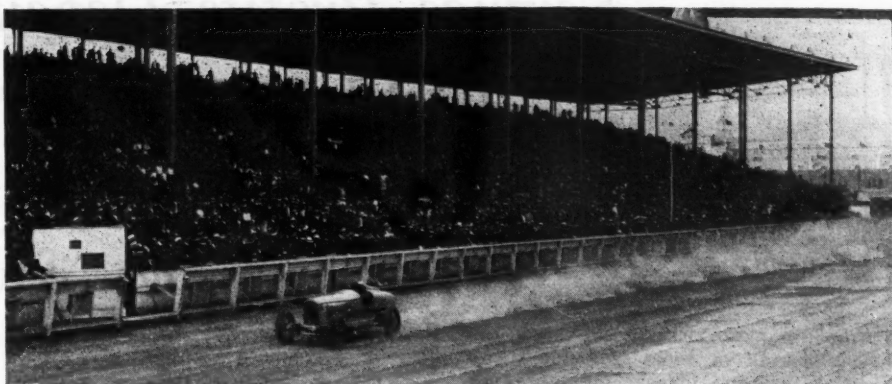
"Your ability to render service may not be questionable, but the general appearance of your place would indicate that such a thing as service is impossible in a lay-out of this kind. The first thought of the customer is to get out of here

as soon as possible after getting in, and you can't blame him."

Now this is a case of the management not preparing for the customer, consequently not holding him. His publicity was faultless, but he spent the same amount of money to get a small job that he otherwise would have spent to get twenty jobs. If he had held the customer after he had him, the publicity would have been twenty times as valuable, because he would have had all the work of that customer from week to week and month to month.

The remedy here is also obvious. A general clean-up, to be brief. Cleaning out the office and arranging it so that it will appear as an office. Cleaning up the garage and neatly arranging the stored cars so they would look as though they had been driven in instead of dumped in and administering about the same sort of cure to the repair shop. Placing the necessary equipment which was not there and arranging a place for everything so that everything could be found in its place and finally requiring the mechanics to wear clean uniforms.

Always bear this in mind. Never fail



De Palma in his Packard 905 lowering the Canadian half-mile dirt track record at the National Motor Show at Toronto, Sept. 6. His time was 33 2/5 sec.

to adopt and execute that which is of value, but do not become so bound up and enveloped with its execution that everything else in connection with it is overlooked. Remember the man who spent all his time and energy in preparing for the trade and did not get it. Re-

member the man who spent all his time and energy in getting the trade and could not keep it. One was no better than the other, but if both had divided their time and attention between preparedness and publicity, they would have been successes.

Sixteen Tractors at Local Demonstration

Affair a Success from General Standpoint But Could Have Been Improved

STREATOR, Ill., Sept. 12—Judging by the comparative differences between the local tractor demonstration at Streator and the national affair at Wichita, the demonstration at Streator this week, Sept. 9-12, staged by the Northern Illinois Tractor Association, and held under the auspices of the University of Illinois, might be said to be successful. The reasons for this are numerous. First, the demonstration is being held by an association of tractor dealers, most of them representing territory in the immediate vicinity of the demonstration and consequently more or less familiar with the farming populace there. Then the mere fact that the demonstration is a small one brings the farmers into more intimate contact with the dealer and the operation of the tractor.

3000 Persons Attended

The attendance at the demonstration on the opening day exceeded expectations, it being estimated by many that close to 3000 persons were on the ground and many of them were farmers out to buy.

Sixteen tractors were exhibited at the demonstration, all entered by the local representatives. They were: Illinois, four-plow; Peoria, three-plow; Avery, three-plow; Parrett, three-plow; Liberty, four-plow; Huber, three-plow; OilPull, one four-plow and one three-plow; Heider, three-plow; Fordson, two-plow; Titan, three-plow; Hart-Parr, three plow; All-Work, three-plow; Wallis Club, three-plow; Cleveland, two-plow.

The demonstration was conducted in accordance with the rules of the Ameri-

can Society of Agricultural Engineers. Particular attention was paid in the plowing to keeping the tractor at its advertised speed. Fuel consumption and dynamometer tests were held, the results of which will be announced at a later date by Ray I. Shawl, professor of farm power machinery, University of Illinois. While proper steps were taken to secure the data of fuel consumed per acre plowed, the results announced cannot be taken as being representative.

The fuel consumed during the plowing test on Wednesday, for example, was not measured until the morning following. After the demonstration the tractors were driven to a farmyard at one of the nearby farms. No exact allowance of the fuel consumed during the drive from the field to farmyard could be made. Further, the tractors standing overnight before the measurement of the fuel gives rise to the introduction of another possible error, namely, that of fuel leakage. After a hard demonstration fuel lines sometimes become unduly stressed, resulting in leakage.

It was unfortunate that the exhibition of the tractors at the fairgrounds in Streator was located at its was, 3 miles from the plowing fields. This proved to be a serious mistake, for the attendance at the exhibition, where the cutaway and dissembled models were displayed, was so small these efforts might just as well have been spared.

EVANSVILLE HAS TRACTOR SHOW

Evansville, Ind., Sept. 14—The Central States Tractor Sales Show, which is scheduled to be held here Oct.

14-17, is to be strictly a selling venture. Dates selected have been made to coincide with the Evansville Centennial Exposition and the 1919 aviation meet of the Evansville Aero club, which assures a good attendance. Admission to the tractor exhibit is free and the promoters have guaranteed an attendance of 100,000.

The show is to be held at Garvin Park, Evansville, and 1000 acres in nearby fields are to be laid out for manufacturers who wish to give demonstrations. W. R. Heilman is in charge of the show and co-operation has been promised by the heads of the farm mechanics departments of the state universities of Purdue, Ohio, Kentucky and Missouri has been promised.

HOUSTON TO HOLD TRACTOR SHOW

Houston, Tex., Sept. 13—As part of a systematic agricultural campaign, the Houston Chamber of Commerce has arranged a tractor demonstration for Sept. 30-Oct. 2 on the Jones farm at Deepwater, Tex. Work in connection with rice growing has been chosen for the test, both because this sort of work offers a thorough test for the machines and because of the desire of Texas agricultural authorities to promote the growing of this crop.

The Jones farm, on which the demonstration is to be held, has a 3000-acre tract available for demonstrations. The exhibit is planned as an educational feature to farmers, for it is estimated that of 500,000 farms in the state, less than 8000 are equipped with tractors. A. E. Hildebrand is in charge of the exhibit.

Service Profits Depend On: EQUIPMENT

Selection and Arrangement of Regular and Special Repair Tools and Fixtures

TO equip a service station with the right kind of tools and not waste money is no small task. It too often happens that in the selection of tools too much is spent for one item—usually a lathe—and as a result the service station operator is handicapped in purchasing other tools which are just as essential.

In these days of high-priced machine tools the best policy to pursue in the purchase of machine tools is to buy a good make of second-hand lathe and drill press. If a standard make is purchased, it can be put in good shape by a day or so of work on the bearings so a machinist can do first-class work on it.

Small Garage Equipment

Many of our small garages get along with an emery wheel, a drill press and a couple of vises. In the larger cities, where there are special machine shops, many garages send their machine work out and thus save the expense of investing in a lot of machine tools which must perforce remain idle the majority of the time as repair parts are interchangeable and seldom require any machine work before they can be used.

The following machine tools will suffice for the average small repairshop.

- 1 lathe, 16-in. swing and 6-ft. bed with milling attachment.
- 1 drill press to handle up to $\frac{3}{4}$ -in. drills.
- 1 emery stand with individual motor control and two wheels $\frac{1}{8}$ by 1 in. and $\frac{1}{2}$ by 10 in.
- 1 arbor press of about 14-ton capacity.
- 1 electric motor and line shafting to suit machine shop layout.

The lathe may appear rather large. However, this size is necessary to handle axle work. If one does not care to handle this large work and only take care of the ordinary operations for which a lathe is used, such as testing axle shafts, camshafts, crankshafts, etc., for trueness and small turning operations, a lathe of 9-in. swing and 4-ft. bed will take care of the ordinary operations nicely. Either of these lathes should be equipped with milling attachments, as it is frequently necessary to straighten up or cut new Woodruff or other keyseats.

In a small shop, where the lathe is used only occasionally, it is not necessary to purchase a lathe with quick-change gears for the lead screw, a compound rest or taper attachment, as these are devices designed to save time in a shop where a machine is in constant service and time is a vital factor. It

THE ORGANIZATION

ROUTING OF JOB

BUILDING LAYOUT

EQUIPMENT

PARTS STOCK

STOCKROOM

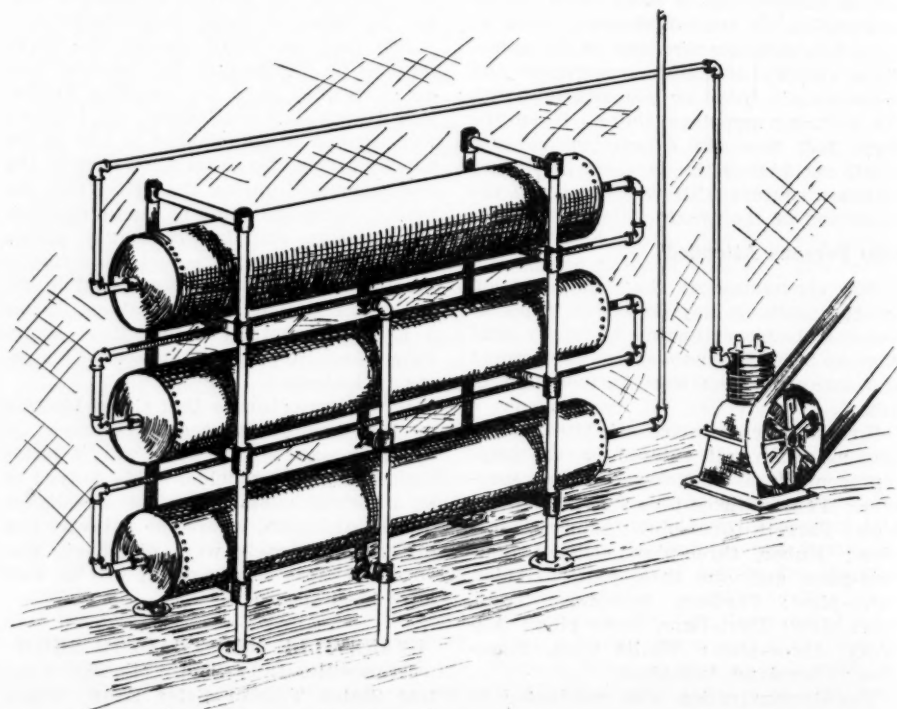
SERVICE RECORDS

is also advisable to follow this in regard to the investment represented, as these refinements cost almost as much as the ordinary type of lathe itself. In fact, the chief idea in purchasing this equipment is to invest the least amount possible consistent with good machines, as

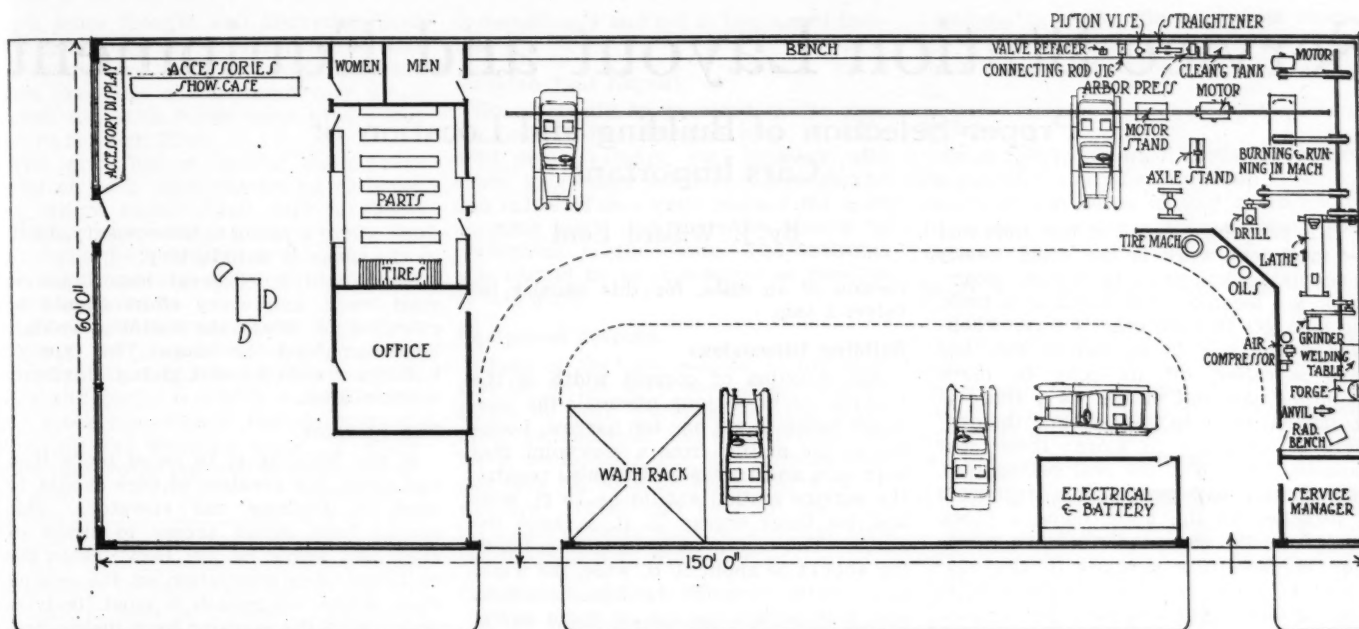
there are other parts of a service station where the money can be used to better advantage, especially the stockroom, which is the heart of a service station and is usually the weak link in most of them.

Among the small tools that are required there are some that can be used to advantage in repair work. In purchasing small tools it is best to buy a good grade, as they are the most economical in the long run, giving less trouble and lasting longer. A number of small tools are absolutely essential to supplement the machine tools as the latter are practically worthless without them. The requisite small tools are as follows:

- 1 set drills 1-16 to $\frac{1}{2}$ in. by 64 in. and 9/16 to $\frac{3}{4}$ in. by 16 in.
- 1 set S. A. E. taps $\frac{1}{4}$ to 12 in.
- 1 $\frac{7}{8}$ -18 S. A. E. tap for cleaning spark plug threads.
- 1 set U. S. standard taps $\frac{1}{4}$ to $\frac{1}{2}$ in.
- 1 set pipe taps $\frac{1}{4}$ to $\frac{1}{2}$ in.
- 1 set expansion reamers $\frac{1}{2}$ to $\frac{3}{8}$ in. by $\frac{1}{8}$ in.
- 1 chuck for drill press to $\frac{3}{8}$ capacity
- 2 4-in. face vise.
- 1 6-in. face vise.
- 1 set lathe tools.
- 1 set Armstrong boring tools.



Method of mounting tanks in place of using a larger tank



Layout of service station showing variety and arrangement of equipment for the average small-town establishment

1 three-jaw universal chuck, size 3 in., for lathe.

1 10-in. independent jaw chuck for lathe.

Of course, there are many other tools that are handy around a repair shop, but the tools listed are essential in addition to the usual assortment of end wrenches, punches, chisels, screw drivers, etc. It is desired to point out that in the initial purchase of equipment it is best to be conservative and then buy additional tools as the profits warrant and also reap the benefit of having had some experience with the class of work you are going to handle and thus be in a better position to determine just what other tools are necessary without going at the proposition blindly.

Next Purchase

Perhaps the first things to be secured as business expands would be a forge, a 50-lb. anvil and a set of blacksmith tools. Then some other tools that are time-savers in a fairly well equipped shop are a universal connecting rod alignment jig, a piston vise, a shaft straightener, an axle stand, an engine stand, an engine burning and running machine and air compressor equipment.

To install an air compressor and get it in right is no small job. Most garages throw their compressor and distribution line in the building in any manner to get it in. They install the line with too small pipe, forgetting that air has a line drop in pressure the same as any other power medium. Consequently, they have to run with an abnormally high pressure at the tank and continually are troubled with line leaks due to this improper installation. A small installation should use at least 1-in. pipe and drop down to $\frac{3}{4}$ in. at the outlets. This will be satisfactory for distances of not to exceed 65 ft. from the tank.

If a large tank is required, as would be necessary with a machine from 35 to 50

cu. ft. air capacity, then it is best to do as suggested in the illustration. This method of installation does not cost any more than one larger tank and saves one the annual inspection fee as small tanks 18 in. in diameter and 72 in. long are not subject to inspection. Another advantage of mounting tanks as shown in the illustration is that practically all the moisture in the air is condensed in the tanks and the air leaves to the line in an almost dry state, thus keeping the line free of water.

To locate the machine tools in the shop without the use of too much line shafting is quite a problem, as each machine must be placed so that it will be accessible and have the advantage of good natural light. For lighting an overhead source and a side light from the rear of the machine operator are best. The illustration of a service station floor plan shows a fair layout with the motor stand and the burning in machine located under the mono-rail track from the shop proper and the other machine tools located as convenient as possible under the existing conditions. To make the lathe more accessible for fit-up work and save the mechanic's time it might be well to locate a short bench just behind the lathe and parallel to the angular wall.

The chief idea in planning a small machine shop is to use the least floor space consistent with good working conditions. This can be best done by first laying out the space allotted to the machine shop and then with the aid of paper rectangles cut to scale to represent the machine shift them around in the layout until the best location is secured with reference to line shafting, the entrance and the lighting.

CLOSED CARS SCARCE IN DETROIT

Detroit, Sept. 12—The Detroit Automobile Dealers' Association is making preparations for its first closed car salon to be held at the Arena Garden Oct. 6-11.

Twenty-five dealers and distributors have reserved space. The greatest handicap the association is experiencing in getting its members to exhibit their lines is the uncertainty of the dealers in securing closed cars in time for the event. Dealers representing factories in Detroit are fairly confident of securing suitable models, but those representing companies in other states are very uncertain.

In the Detroit district dealers unanimously declare that fully 50 per cent of their customers prefer closed cars to the open models. Inasmuch as closed car production represents less than 30 per cent of the total output, there is a great shortage of this line and few dealers are able to make closed car deliveries within sixty to ninety days.

For instance, at the Haynes-Detroit Co., local distributor of the Haynes car, four sales were recorded one day last week. Three of the purchasers selected open models, while one, willing to wait two months for his delivery, bought a sedan. Had closed cars been available for delivery within thirty days, two of the men who bought the open cars would have taken the closed model, the salesman states.

NO NEW PACKARD SOON

Detroit, Sept. 12—If a six-cylinder is to be built by Packard, as reported, it is still in the formative stage, officials say, and its appearance is a matter of months, if not years.

That Packard has been working on a new model is known, but company officials can see no reason why this should cause the circulation of new car rumors, inasmuch as the engineering department has conducted such experimental work for years. The company now has several experimental cars in its shops, ranging from four-cylinder machines to models in which sixteen-cylinder engines have been installed.

Service Station Layout and Equipment

Proper Selection of Building and Location of Cars Important

By J. Willard Lord

ONE prominent cause of lost time and inefficient work is the often totally unadaptable buildings in which repair-shops are located. The building is dark, the men get in each other's way; whenever a car has to be moved out, the gang is called off its jobs to move six other cars out of the way; there is insufficient room to work around the car; there is no place to store "those seat cushions," which is the real reason they were spotted with grease; the stockroom is attached to the main office a block away from the shop and workmen whose time is cheerfully charged to the customer at \$1.25 per hour saunter from shop to stockroom and back for a spare part and back again in 10 min. for another. These conditions can be verified almost anywhere and serve to emphasize the necessity of good service station layout.

Good layout facilitates time saving by making the building accessible, so vehicles can go in and out of the shop without moving other vehicles and disturbing the men working on them. It makes possible the use of floor area to the best advantage and permits of a maximum number of cars in work. One cannot emphasize too strongly the importance of correctly placing the elements of a repair building, such as columns, doorways, elevators, stairways, shop offices, stockroom, toolroom, etc.

Repair work carried on in an unsuitable, poorly laid out building places a wasteful tax and needlessly high repair charges on every job done in that building. Workmen are quick to realize any fault and use it consciously or unconsciously as an excuse for not producing the best of results. The very nature of layout defects are such as to be most difficult and expensive to eliminate and, therefore, it is important to plan with the greatest of care and to get the best experience and talent before building. When the building is up one has either a permanent aid or impediment to good work at low cost.

The Center Aisle Principle

The most economical use of floor space consistent with accessibility is a center aisle with cars on both sides, as the diagram will show.

Suppose a man rents a building 40 ft. wide and puts cars in it. (Fig. 1.) This same floor area arranged in a 60-ft. building (Fig. 2) permits placing 33 per cent more cars and yet maintains a clear aisle. This fundamental is so simple it seems almost absurd to demonstrate it, and yet it is ignored time and again, not only in renting buildings and placing vehicles but in placing stockbins, workbenches, etc.

One also should avoid changing the di-

rection of an aisle, for this usually involves a loss.

Building Dimensions

The question of correct width of the building is of serious moment, the tendency being to get one too narrow. Looking at the matter from a viewpoint that both cars and trucks will require repairs, the service station should be 70 ft. wide and for large trucks 75 ft. is none too much. The center aisle in such a building should be about 20 ft. wide, the wider spans being over the vehicles in repair, and thus permit the use of crane equipment to fullest advantage. Center distances between columns, running the length of a building should be between 20 and 24 ft., which will permit placing two cars or trucks between centers. for this often permits placing three cars between centers and gives a little more room for two trucks. The ceiling in the clear should be about 14 ft. high to allow Twenty-four-foot distances are preferred sufficient headroom for the crane. On a

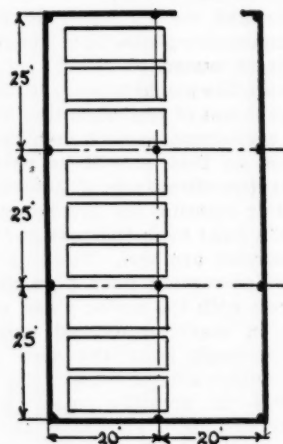


Fig. 1—In this 40 by 75 plan only nine cars can be stored, an average of 333 sq. ft.

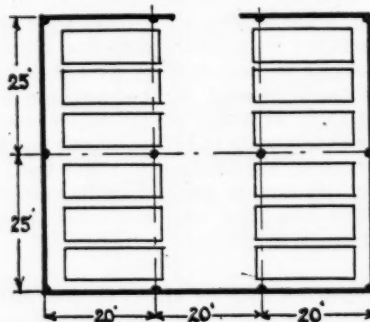


Fig. 2—In this 60 by 50 plan twelve cars can be stored with 250 sq. ft. to each car

floor where a crane is unnecessary, 12 ft. in the clear is satisfactory.

Good light is of great importance to good work, and every effort should be extended to locate the building so daylight can flood the shop. The type of building should be that giving maximum window area.

The Elevator

If the building is to be of more than one story, the greatest of care should be used in locating the elevator. This should have direct access to street or alley and never be put back inside the building. Any congestion on the ground floor, where congestion is most likely to occur, with the elevator back inside, prevents getting on or off the elevator and thus ties up the whole building. This can be entirely avoided by placing the elevator with direct access to the outside. The elevator platform should be about 10 ft. by 24 ft., unless it is known definitely that the building will always be used for small cars, in which case a shorter elevator is permissible.

Shop Entrance and Office

Entrances to a shop take good working space and, where more than one, increase the difficulty of controlling incoming and outgoing cars and the keeping of undesirables out of the shop.

Examples of the best and largest service stations have but one entrance for all incoming and outgoing work, and if a big place can handle its work with one entrance, there seems to be no excuse why a smaller place should have two doorways and waste just so much of its limited working floor area.

One entrance to a shop, 11 or 12 ft. wide and as high, with shop offices adjacent to control cars and individuals going in and out of the shop, seems to best meet the requirements.

The layout of shop offices demands thought to secure an executive office opening into the shop and yet available to customers or others from the outside who need to see the shop superintendent.

Stockroom and Its Location

A good spare parts stockroom is an essential adjunct to a good repairshop. It, first, should be placed so as best to serve the shop and, second, so as to be convenient to such owners or drivers as wish to purchase parts. This helps cut down the loss of time in getting parts out of stock and to the job, which often is quite an item of costly delay, particularly where the agent has expanded his business and secured a second building for repair work.

The stockroom should be kept as small as possible, which best can be accomplished by taking much greater advantage of the cube than is the average, that is, stock racks should be built higher and

much more thought and discretion used in determining the various bin sizes and the number of each required. All too often one finds a stockroom very much spread out with large stock bins about 5 to 10 per cent filled.

The principal of center aisles with racks on both sides should be observed and where racks stand back to back, common backs of $\frac{1}{4}$ to $\frac{3}{8}$ -in. wire net will make the bins light in the back corners and improve the lighting of the whole stockroom.

As to bin arrangement and disposition of parts, the plan of racking by grouping principal assemblies, then sub-assemblies and parts, is highly recommended. The stockroom should include adequate receiving and shipping space. A stockroom that works out well is composed of:

Per cent	Dimensions
75 bins	6 x 6 x 12
9 bins	9 x 9 x 12
5 bins	12 x 12 x 18
6 sections of open shelving.....	36 x 12 x 15
4 drawers with partitions.....	6 x 6 x 12
1 large bin.....	12 x 18 x 18
	18 x 24 x 18

Note the large percentage of the smallest size bin.

Making the stockroom accessible to the shop does not mean necessarily putting it on the same floor. Occasion will arise where, to secure a shop of proper size, a whole floor is needed, in which case the stockroom, on another floor, should be made accessible to the shop by dumb-waiter, this to come up into the toolroom, in the shop.

Toolroom

The toolroom is a necessary part of the shop which, with adequate tool supply, can be kept quite small if thought is used in racking the tools. An inclosure 7 by 15 ft. works out nicely for an average shop.

In the average agency repairshop it is often possible to combine tool and stockroom in the same inclosure, which makes possible handling these two elements with less help than if separated. The toolroom should include space for shop supply of oil and grease. Grease can be issued in grease guns charged by the toolroom man at odd moments, which saves time on the job.

Tools and Methods of Work

The repairshop offers the best of opportunity to develop special repair tools and determine the best way to overhaul an engine, a transmission or rear axle. This information when put in the hands of all agents increases the efficiency of their shops just so much.

Just as much can be gained by study of methods of repair as has been gained by study of production methods. A repair job consistently may take the time of two men 3 to 4 hr. and then have the method revised of doing the job and discover it could be done just as easily by two men in an hour. It means every man should have his own complete kit of hand tools, in a suitable container, so any tool can be located quickly. It means tools should be got together and know you have the necessary parts on hand before starting a job. It means repair jobs and testing and tuning should be gone after

systematically and not in haphazard fashion.

Machine Tool Layout

Space should be provided in the shop for four or five machine tools, a lathe, drill press, grinder, etc., together with space to rebuild engines, transmissions and axles. These units require the most machine work and therefore should be convenient to the tools. The toolroom also should be as convenient as possible to this work.

Equipment Storage

Many of the cars coming in for work will be in the shop some time, and the extent of work demands that the equipment be removed and stored until the job is completed. For this purpose storage bins $3\frac{1}{2}$ by 4 by $3\frac{1}{2}$ ft. serve to advantage. These can be built up three high and on both sides of a center aisle about $3\frac{1}{2}$ or 4 ft. wide.

Car Wash and Parts Wash

A car wash is necessary in every shop, not only for general car washing but for thoroughly washing a chassis before extensive work is started. This washing saves much time, and where steam is available, the washing can be done quickly and thoroughly.

The parts wash is strictly a shop proposition and is a small place 6 by 8 ft. or 7 by 9 ft. where parts of torn-down units can be thoroughly cleaned before

commencing work. Steam permits washing the parts in hot soda bath, the tank for which should be about 3 by 4 by $2\frac{1}{2}$ ft.

Toilets

Good toilet and wash facilities should be provided and when the shop is large, toilets should be so located as to make it unnecessary for a man to leave his department.

Sheet Metal and Blacksmith Work

Work of this kind demands an inclosure to meet fire regulations, which space varies from a small corner 12 by 15 ft. to a very sizable department in large service stations. With the development of welding, provision for this kind of work is becoming essential.

Electrical Equipment Repair

Space for this kind of work should be provided for in a shop of any size. Twelve to 20 ft. of bench will take care of necessary equipment for this work. The equipment should include test apparatus with variable speed drive and necessary meters.

Repair of storage batteries is something which can be handled best by regular service stations. A set of cadmium test rods might well be added to the equipment. An inclosure 8 by 12 ft. will take care of average conditions.

Paint and Trim

This class of work demands a special class of labor and should be gone into only when the volume of such work warrants doing so. In other words, a paint and trim shop in a large service station will show good results, but such work had best be sent outside by the small shop.

Power, Compressed Air, Benches

The shop should be wired for electricity and plugs located conveniently for taking current to operate breast drills, etc.

Compressed air can be put into a shop at small outlay. It is of the greatest value for cleaning purposes, and cleanliness is essential to good repair work.

Benches laid out along the sides of the shop provide bench space at every job which works out nicely.

Crane Equipment

In a large repair shop a 1-ton crane, hand-operated, will greatly facilitate work. An overhead monorail with 1-ton trolley and block is the next best. The monorail is far superior to a portable crane and costs but little more.

General Arrangement

In making the general arrangement of the various elements entering in the makeup of the shop, the greatest care should be taken to avoid breaking up the shop floor area into a series of partitions, corners and nooks. Place the elevator at the end of the building with stairs adjacent and toilets, offices and storage space at the same end. By concentrating these elements, one gets a fine, clean, open shop without obstruction which facilitates handling the work and supervision of same.

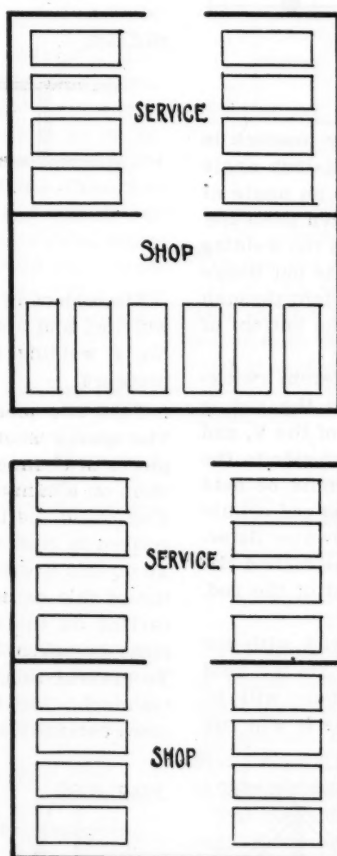
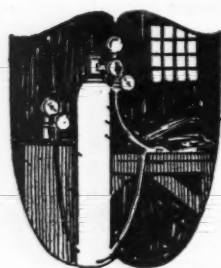


Fig. 3—Note the difference in the number of cars stored in each of the above. With the cross aisle fourteen cars are accommodated; with the straight aisle, sixteen



Autogenous Welding in Automotive Repairs

By Thomas P. Bowman



This is the thirteenth installment of a series of articles that are to be published in MOTOR AGE each week. The author has had practical experience in motor car repairshops which enables him to present first-hand information on practical welding in a clear and concise manner. No difficulty should be encountered in this work, provided the reader will apply all the methods given herein.—Editor.

Part XIII—Practical Methods

THE No. 12 welding head should be used with 25-lb. oxygen pressure. Use $\frac{1}{4}$ -in. welding rod. Proceed from one side exactly as in No. 7, but see that the weld is reinforced $\frac{1}{8}$ in. When one side is finished turn the piece over and the finish the other. Be sure the bottom of the V of the second side is thoroughly melted so it will meet the bottom of the weld of the first side. This point is very important. When the first side is completed and turned over, take the welding rod and scrape off any scale formed during the welding.



Fig. 48—Method No. 9

METHOD NO. 9

The object of this problem is to get preliminary practice in vertical welding. Take two pieces of 3 by 3 by $\frac{1}{4}$ -inch angle iron. The two edges to be welded are beveled at an angle of 45 deg. Use a No. 7 welding head and 16 lbs. oxygen pressure. Place the pieces together, keeping one flange flat on the welding table so the other flange is vertical. Proceed on the flat flange as described in No. 5. Be sure the weld is carried right through to the corner and that it penetrates through to the bottom of the angle.

In vertical welding the flame is given a little different swinging motion than in the horizontal welding; also the rod is handled differently. The rod is held in the middle of the V, and the flame, by a swinging motion, is moved from one side to the other without touching the rod. The blowpipe should be held at about 90 deg. to the vertical flange. The welding rod should be placed in the V about $\frac{1}{8}$ inch ahead of the blowpipe flame. When the metal at the bottom of the V has become melted the blowpipe should be swung upward around the end of the rod. This will melt the rod and the middle of the V.

The blowpipe then is swung down under the rod with the result that the molten metal will flow into the V. Do not hold the flame too long in one place; otherwise a hole will be burned in the metal. Do not overheat the metal, as it will run

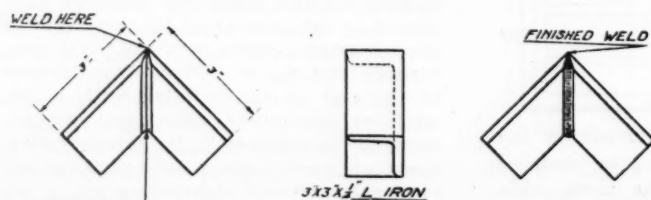


Fig. 49—Method No. 10

too freely. Care should be taken that a neutral flame always is used. As the welding progresses, care should be taken that any of the metal that flows back is worked over and not left to be removed after the weld is finished. The same precautions that apply in all steel welding also apply in vertical welding.

METHOD NO. 10

The object here is to give further practice in welding structural steel sections and also in vertical welding. Use a No. 7 welding head with 16 lb. oxygen pressure and $\frac{1}{8}$ -inch welding rod.

Prepare the samples by cutting two pieces at an angle of 45 deg. so when placed together they will make a right angle. The edges to be welded should be beveled at 45 deg. The blowpipe and welding rod should be manipulated exactly as in No. 9.



Fig. 50—Method No. 11

METHOD NO. 11

The object of No. 11 is to give further practice in vertical welding, and also introduces a little overhead welding. Use a No. 7 welding head, $\frac{1}{8}$ -inch welding rod and 16 lb. oxygen pressure.

Take two pieces of channel iron and bevel them at 45 deg. The pieces should be beveled from the inside. Place these pieces of channel iron on the edge of the welding table, resting them on a flange. This will place the web in a vertical position. Then weld the lower flange and arm exactly as previously described in Nos. 9 and 10. Weld the top flange from the inside. To do this it will be necessary to work from underneath. Welding of this nature is called overhead welding. This should be carried on the same as vertical welding, except greater care must be taken that the metal will not run out when melted. To prevent this, care must be taken that it will not be melted too much. Also the welding rod and blowpipe should be handled more carefully and skillfully.

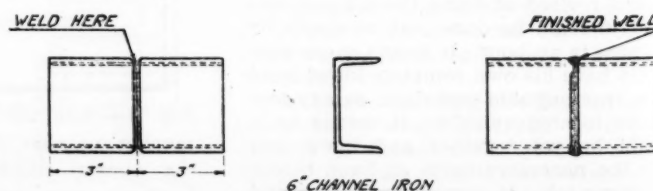


Fig. 51—Method No. 11-A

METHOD NO. 11-A

Prepare two samples and weld exactly as given in No. 11, except the weld is to be made on the outside of the channel instead of the inside.

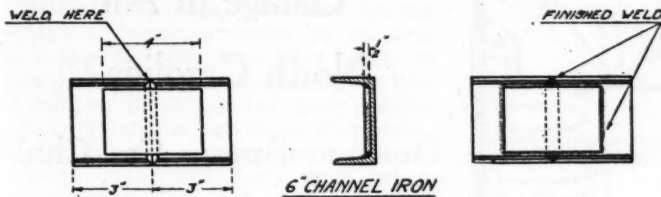


Fig. 52—Method No. 12

METHOD NO. 12

The object of this is to get experience in applying reinforcing plates to channel or other structural steel sections. Prepare the channel and weld the same as in No. 11. Then cut a 1/2 in. plate 8 in. long to the width that will fit inside the flange of the channel. Place this plate inside the channel and weld it to the channel on all four sides, starting at one corner and continuing all the way around. Use a No. 7 welding head for welding the channel, 16 lb. oxygen pressure and 1/8-in. welding rod. In welding the plate to the channel, use a No. 8 welding head, 19 lb. oxygen pressure and a 3-16-in. rod.

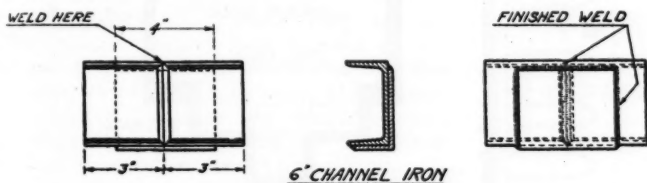


Fig. 53—Method No. 12-A

METHOD NO. 12-A

The object of this problem is to show another method of placing a reinforcement on the channel section when it is not possible to put the plate inside, as shown in No. 12.

Take two pieces of channel iron of the same size as in No. 12. Prepare to weld them in exactly the same manner, except the weld in this case is carried on from the outside. Then take a section of the same size channel 8 in. long and cut off one of the flanges. Then place this piece around the welded channel with the inside of the web of this piece around the bottom flange of the channel. Then weld around this piece. This weld should be carried on with the channel held always in a vertical position.



Fig. 54—Method No. 13

METHOD NO. 13

The object here is experience in butt welding of pipes or tubes. Take two 6-in. lengths of standard pipe of the diameters given, select the proper size welding head and filling rod for each size. See welding table in article No. 1. Prepare these

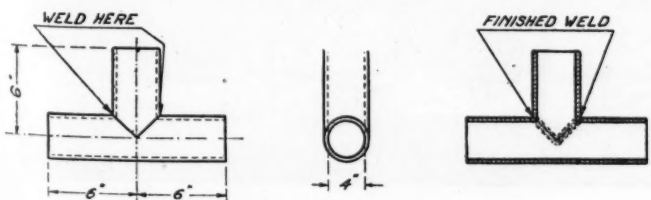


Fig. 55—Method No. 14

pieces by beveling the edges at 45 deg. The two pieces of pipe should be placed together and tacked in three or four places. Tacking consists of making a small spot weld, starting from the bottom of the V and filling it up about half of its depth. It should never be more than an inch long.

METHOD NO. 14

The object of No. 14 is to make a T out of 4-in. pipe. Take a 12-in. length of pipe, lay out and cut out a hole to fit a 4-in. nipple. Then cut the end of the 4-in. nipple to fit the pipe. Then weld around the joint. In piping of this size it is not necessary to make a V for welding. Because of this, care should be taken that the weld is made clear through the metal.

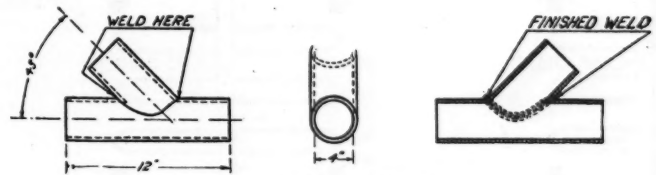


Fig. 56—Method No. 15

METHOD NO. 15

The object of this problem is to make up a 45-deg. branch. First lay out and cut out a hole for a 4-in. nipple in a 4-in. pipe 12 in. long. This nipple is to be set at 45 deg. This should be laid out so the nipple will fit inside the pipe. Then cut the nipple so it will conform to the pipe. Then weld with the proper size welding rod and welding head. See welding table in article No. 1.

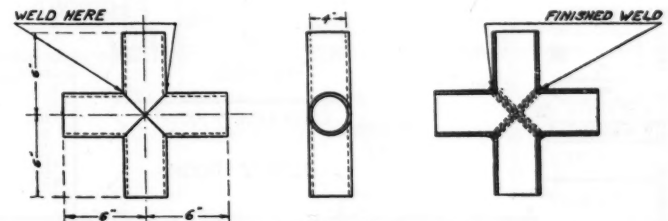


Fig. 57—Method No. 16

METHOD NO. 16

The object of this problem is to make a cross of 3-in. pipe. Proceed the same as in No. 14, except the 12-in. piece of pipe is cut out on both sides instead of only one side. Then cut out two nipples as was done in No. 14. Place one in one of the cut-outs in the 12-in. length of pipe and weld it in. Do the same with the other nipple.

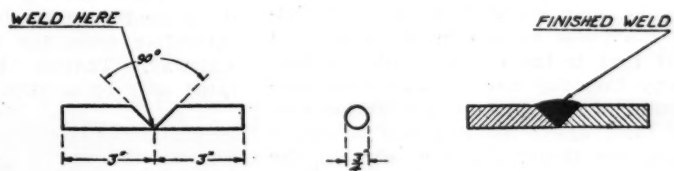
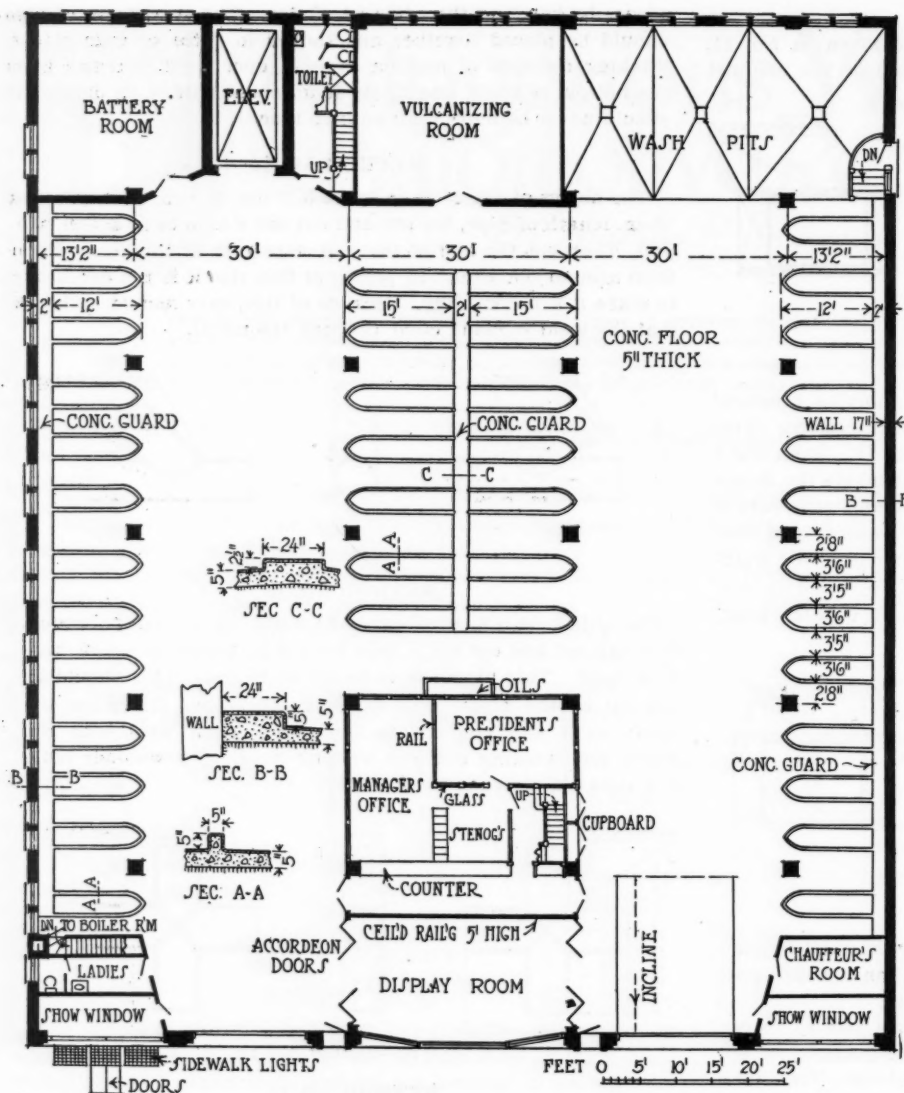


Fig. 58—Method No. 17

METHOD NO. 17

The object of this problem is to give practice in the welding of round rods or shafts. Take two pieces of 3/4-in. rod and bevel them 45 deg. all the way through from one side. Because the amount of metal is so much smaller than that in 3/4-in. plate, a smaller welding head is used. Use a No. 8 head and 19 lb. oxygen pressure.

The method of welding is exactly the same as any plate welding. Extreme care must be taken to prevent the melted metal from running out of the weld and to prevent it from running down on the cold sides. Welds of this kind must be made with great care and thoroughness. The blowpipe must be swung continuously from one side to the other so both sides melt at the same time and the welding done as quickly as possible.



First floor of Durham garage, showing individual stalls for cars

IN the center of North Carolina, with a population of 30,000, is the city of Durham, the home of Bull Durham tobacco. But this is not the point with us. Our readers are more interested in garages, and Durham is just completing the finest garage in the state. At least that is the claim of the Durham Buggy Co., the builder, and state distributor of the Mitchell and Winton cars and local agent for Republic trucks, a claim, we think, any one else in the state will have to go some to disprove.

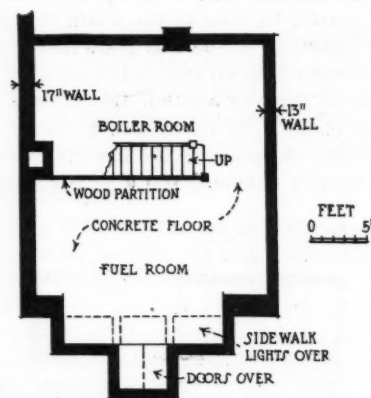
The building is a fireproof steel and reinforced concrete structure 120 by 147 ft., in the heart of the business section of the city, with stalls for forty cars and space for fourteen cars besides on the first floor. The second floor accommodates over fifty cars and will be used principally in connection with the distribution end of the business. Advantage is taken of the privacy of the second floor in the location of the repairshop so the storage customers cannot bother the shopmen. The builders are very proud of their entrances, which are spacious and light on each side of the central offices and salesrooms. Both entrances are wide enough for two cars

to pass and are in pleasing contrast to the regulation entrance through a narrow dark hallway between salesrooms and offices.

The parts and accessory stockroom on the second floor are large and light and accessible from the office below by a stairway. Though this room is separated only by a wire partition, the ma-

Is This One the Finest Garage in All North Carolina?

Durham Buggy Co. Challenges Denial With \$85,000 Building

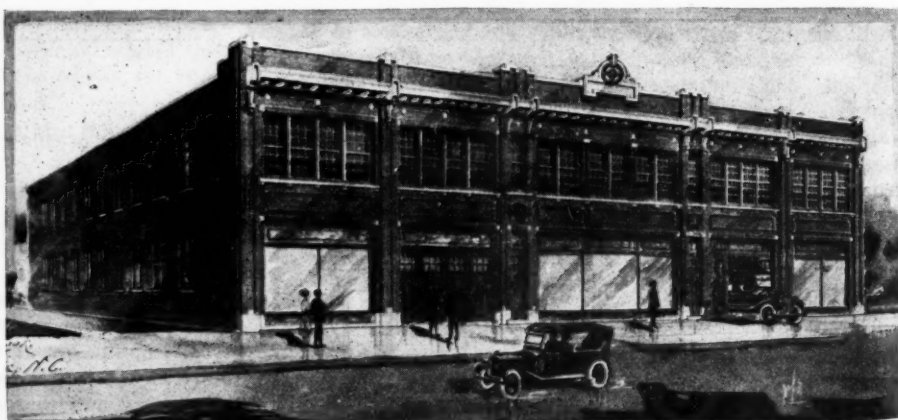


Sidewalk lights brighten the basement

chine shop and battery room on the first floor have brick partitions, enabling the company to avoid the insurance penalty for the use of open torches in these departments.

Supporting posts are placed to facilitate car storage without wastage, being 22 ft. 8 in. longitudinally and 30 ft. laterally, so three cars can be placed side by side between them one way and two cars end to end or a car and an aisle between them the other way. With the same idea in mind, the row of posts at the side of the building is just far enough from the wall so the posts will be between the cars and not in the aisle.

Another feature meriting attention is the flatiron-shaped curb in the center of each stall, which is hollowed out to



Exterior of the garage owned by Durham Buggy Co.

form a reservoir into which a car will be drained. The building and lot together cost \$85,000.

BIG SHOW FOR SOUTHWEST

Dallas, Tex., Sept. 13—Plans for the Southwest motor car show to be held here the fortnight beginning Sept. 30 give one of the most comprehensive lists of exhibits which has ever been secured for the event. All available show space has been contracted for, the list of exhibitors comprising forty firms which will show fifty makes of car and nineteen makes of truck. Eighteen accessory dealers also will exhibit.

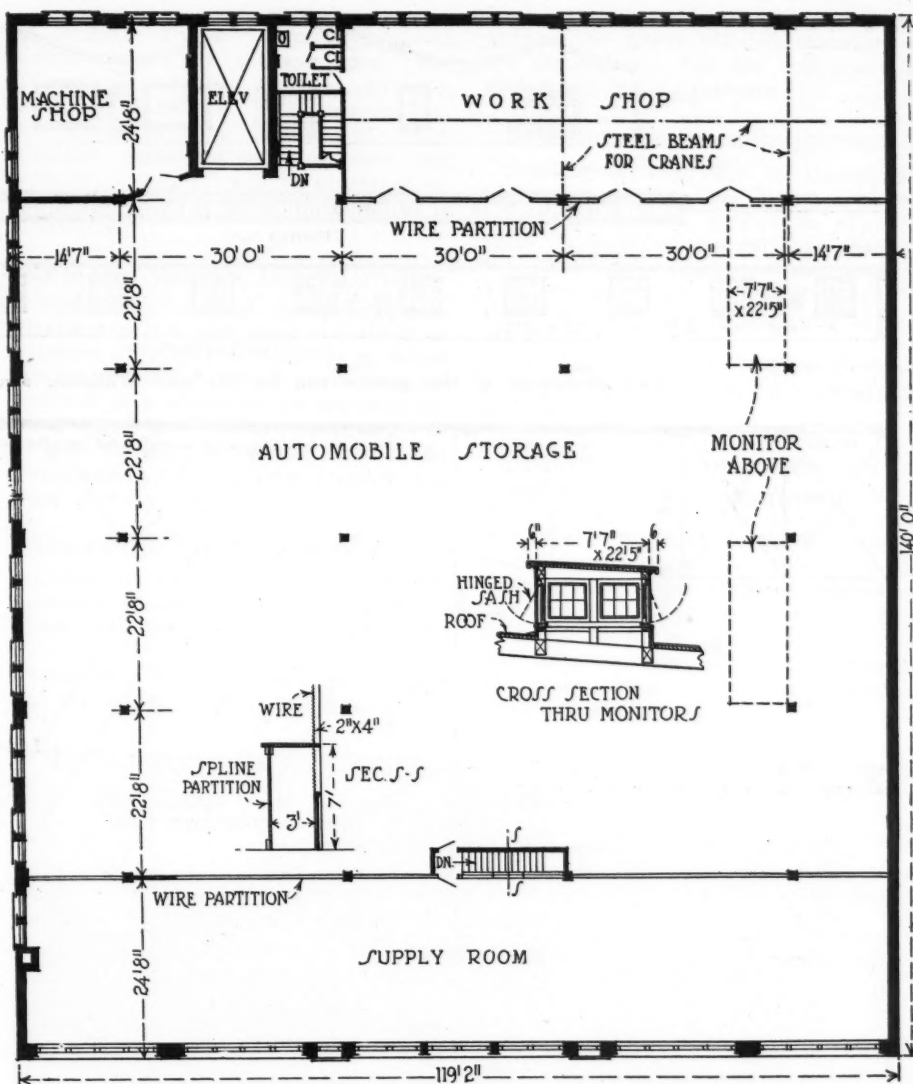
While the show will be held for the entire Southwest, it is being conducted primarily by the Dallas Automobile & Accessory Dealers Association. In addition to the display of cars and trucks, numerous other features of entertainment, including dancing, have been arranged for.

Signboards Guidebooks for Motorist

CALIFORNIA, a state rich in romantic history, has become as an open book to the motorist through the activities of the advertising department of one of the large tire manufacturing companies, and today he who rides may read, to paraphrase an old saying.

Other states throughout the union no doubt are by this time being treated in the same manner, and thus the tourist as he approaches a city will find prominently placed one of these neatly executed signs, representing the leaves of a book, on one page of which appears in concise form a history of the hamlet or city, while on the other page is given the advertisement of the tire concern.

Take San Diego, Cal., as an example. It was the site of the first of the long chain of Franciscan missions to be established on the California coast, and



Here is the second floor of the Durham garage, showing shop

the ruins of the mission, the lone surviving palm tree of a group planted in 1769 by the padres, the memorial to

the hoisting of the stars and stripes by Fremont, the cross to the memory of Father Serra, the leader of the Franciscans, and various other things of interest to the tourist are to be seen to-day, and the big sign calls these things to his attention.

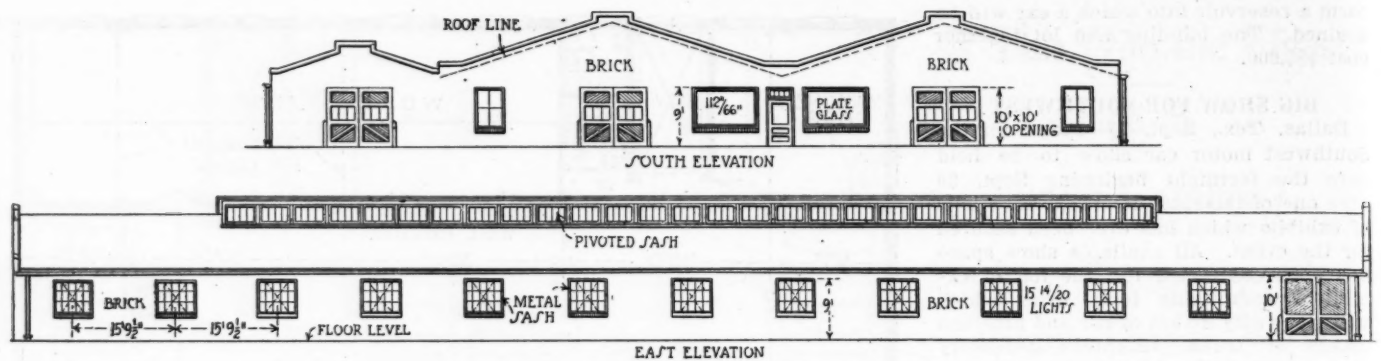
As with San Diego, so it is with many other places throughout the Golden State, and the signboards take the place of the guidebook. With the signs appears the representation of an immense inkwell, with a giant quill sticking from it, to carry the idea that the history of the community has thus been set down.

CURTISS HAS WAUKEGAN PLANT

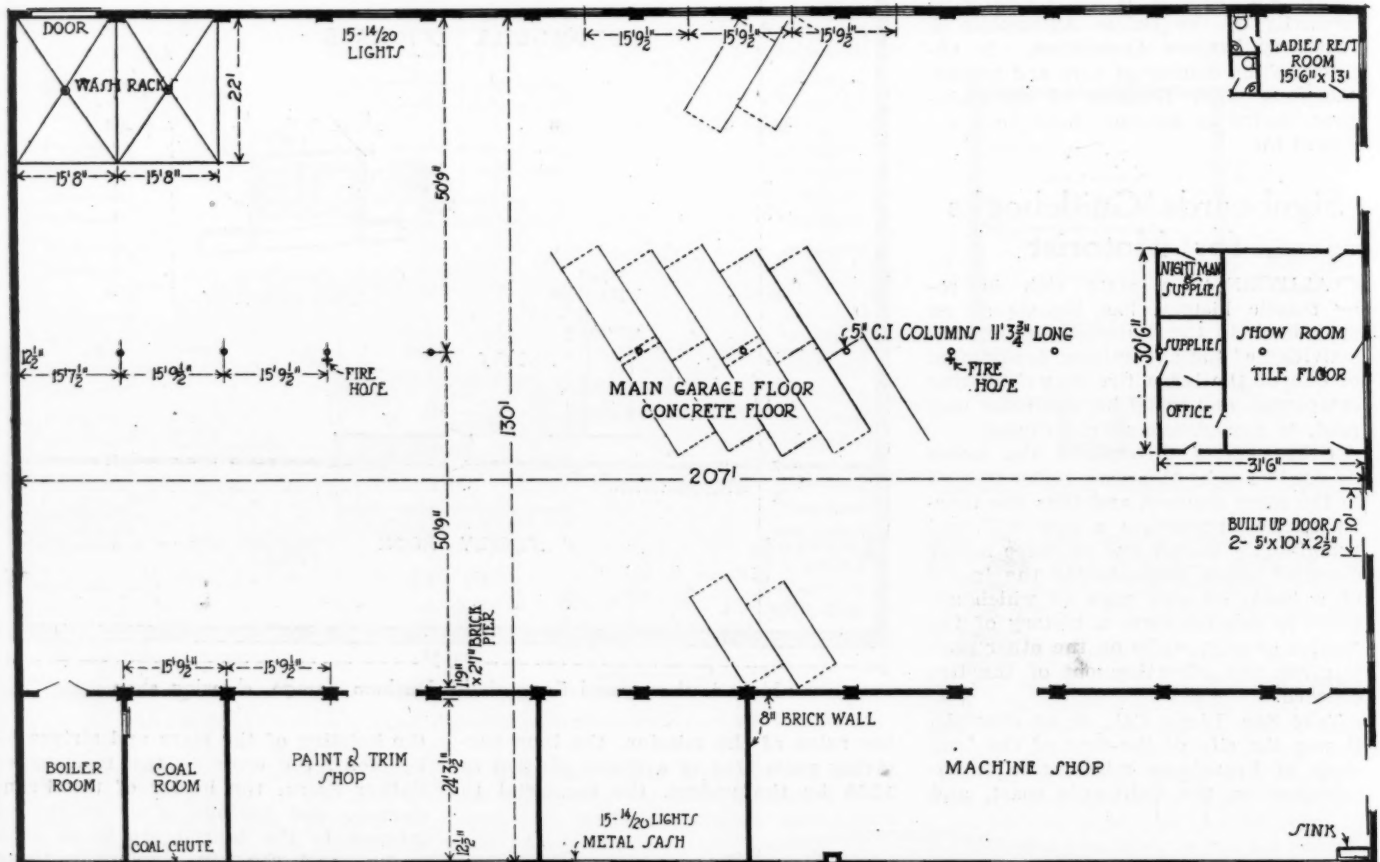
Chicago, Sept. 12—The Curtiss Aeroplane Co. has leased a four-story building at Waukegan, containing 90,000 sq. ft., which is to be used as headquarters. This site was chosen, it is said, because of its nearness to tracts available for landing fields. The building is to be used for storing and assembling planes. About forty machines have arrived from the East, and it is stated as many more are to come shortly.



Road sign near San Diego, Cal.



Two elevations of the garage run by Jay and Williams, showing the lighting system



Floor plan of Jay, Williams & Co. garage. Note the scheme for placing cars on floor

Pointers From a Small-Town Garage

Clean Business Methods, Well Kept Premises and Prompt, Efficient Service Basis of Success Here

IT is seldom in small and medium-sized towns that one finds a garage devoting its entire attention to storage, but Jay, Williams & Co., Kokomo, Ind., operating the Auto Inn, have made a success of this branch in spite of the fact that both Jay and Williams have been in government service during the war. They base their success on clean business methods, well kept premises and prompt, efficient service as far as it goes.

At present they are feeling the need of a more extensive repairshop, however, one that will relieve their customers of hav-

ing to go elsewhere for their repair and overhauling service, and are adding the small or comparatively small west section shown on the plans.

A scheme of placing cars on the floor which is very good has been devised. Whether this was premeditated when the building was planned we do not know, but the spacing of posts is just right, and we presume it was.

Instead of backing cars up at right angles to the wall and aisle, they are placed at an angle as shown on the floor plan. White lines are painted on the

floor to correspond with the black ones spaced 6½ ft. on centers. Being turned at an angle as they are, it is much easier to enter the narrow spaces, and an attendant is always at hand to aid the driver in getting his car in position. Cars enter at the right, or east, entrance and exit at the left and always back into place.

Ordinarily cars placed at an angle take 1½ ft. more space from the aisle than when placed square, but here this loss is regained in the two center rows whose backs overlap as it were.

Another wrinkle well could be copied by other garage men. The night man has a stock of the more-commonly-called-for accessories, which he buys from the main stock and keeps in a cupboard in his room. In this way he gives aid to tourists without having keys to the office or mussing up the records.

This building ordinarily stores 100 cars, but in winter the number is increased to 150.

The company points with pride to the heating plant, which uses about 85 tons of Illinois coal per winter, a very good record, though they do not keep the temperature high—about 45 to 48 deg., claiming a higher temperature causes body varnish to crack when cars are taken into extreme cold outside. Heating coils are in the form of cast-iron radiators suspended from trusses overhead.

Cost data on this building would be of no value now, as it was put up during the low ebb in prices just as the European war broke out.

IOWA HAS THEFT BUREAU

Des Moines, Iowa, Sept. 12—Iowa is going to organize on a systematic basis to run down car thieves. At a recent state meeting of Iowa county sheriffs the Iowa Auto Theft Bureau was established and headquarters will be opened in Des Moines. A committee from the sheriff's association has taken the matter up with Governor Harding, who offered to give the theft bureau the services of a state agent. Plans for the bureau call for an officer to be in the central clearing house constantly working on motor car thefts. Each sheriff in the state will give report of thefts and also of recoveries. The bureau also will seek to enforce the law which makes it unlawful to buy used cars without a certificate of registration, giving full description of the car.

J. E. F. PLUG REORGANIZES

Milwaukee, Wis., Sept. 15—The J. E. F. Spark Plug Co. has changed its corporate style to the Viktry Mfg. Co. The name of the J. E. F. Sales Corp. has been changed to Viktry Sales Co. The name of its principal product will be the Viktry Disc or V. D. spark plug. A new plant costing nearly \$50,000 has been erected. Franklin Ramstack and sons, formerly active in the J. E. F. companies, have organized the Ramstack & Sons Mfg. Co., capital stock, \$100,000, and will manufacture the J. E. F. spark plugs in the original plant.

WHEAT TRACTOR MEETS TROUBLE

Buffalo, N. Y., Sept. 13—The Hession Tiller & Tractor Co., manufacturer of the wheat tractor, went into receivership Sept. 13. Robert E. Powers is temporary receiver.

The firm has a capitalization of \$10,000,000, but the amount paid in is understood to be but a fraction of that amount. The Hession company is incorporated under the laws of Delaware and had its plant near Detroit until George E. Pierce became its president, when it was moved

to Buffalo. The receivership followed action taken by the creditors. Mr. Pierce's loss in the company, he said, amounts to \$50,000. He contends that his assets, although slow, will reach \$500,000, while his liabilities are but \$250,000. The firm will be continued by the receiver as a going business, it is understood.

TRAYLOR TRUCKS AND TRACTORS

Allentown, Pa., Sept. 12—The Traylor Engineering Co. will commence the manufacture of trucks in addition to larger tractor production. New plans were announced at a dinner of the company executives. Trucks and tractors will be of new design, a high-speed, light model improvement of the tractor company has been making.

COLUMBUS TRADE HAS OUTING

Columbus, Ohio, Sept. 12—About 100 members of the Columbus Automobile Trade Association attended an outing held at Columbia Park, southeast of Columbus, Sept. 4. The arrangements for the outing were made by C. S. Ma-

gruder, the newly selected manager of the association. The day was spent in games and various contests.

COLE PLANS 6500 PRODUCTION

Indianapolis, Ind., Sept. 12—During the present year, the Cole Motor Car Co. anticipates a total production of 6500 cars. It manufactures only one chassis, the Aero-eight, with nine body styles. The present output of the company is twice that of any other year in its history.

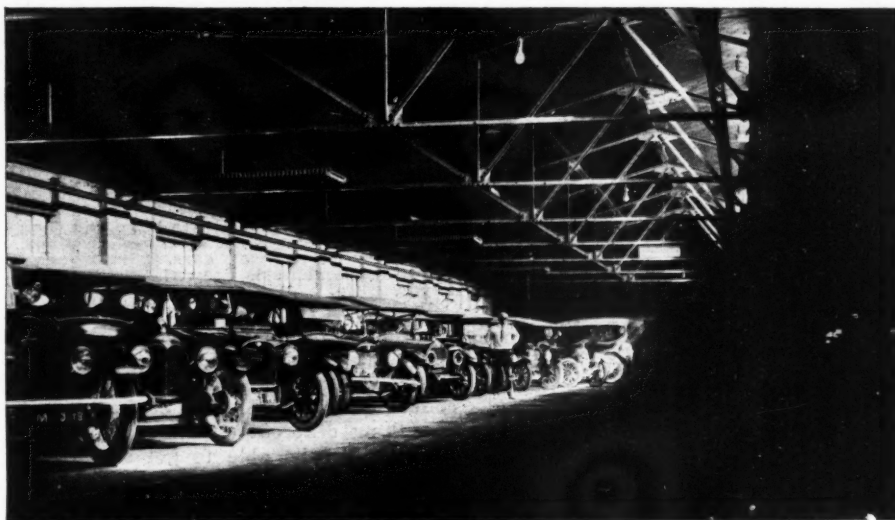
The company has declared a dividend of 20 per cent, of \$20, to all stockholders of record.

TRUCK TOUR FOR NEW YORK

Buffalo, N. Y., Sept. 12—Western New York will be visited by a fleet of trucks during the week of Sept. 22-27 under auspices of the Buffalo Motor Truck Dealers Association. Twenty distributors have entered the tour. A band will be carried in one of the trucks and talks will be given along the route. At evening stops there will be exhibitions of motion pictures.



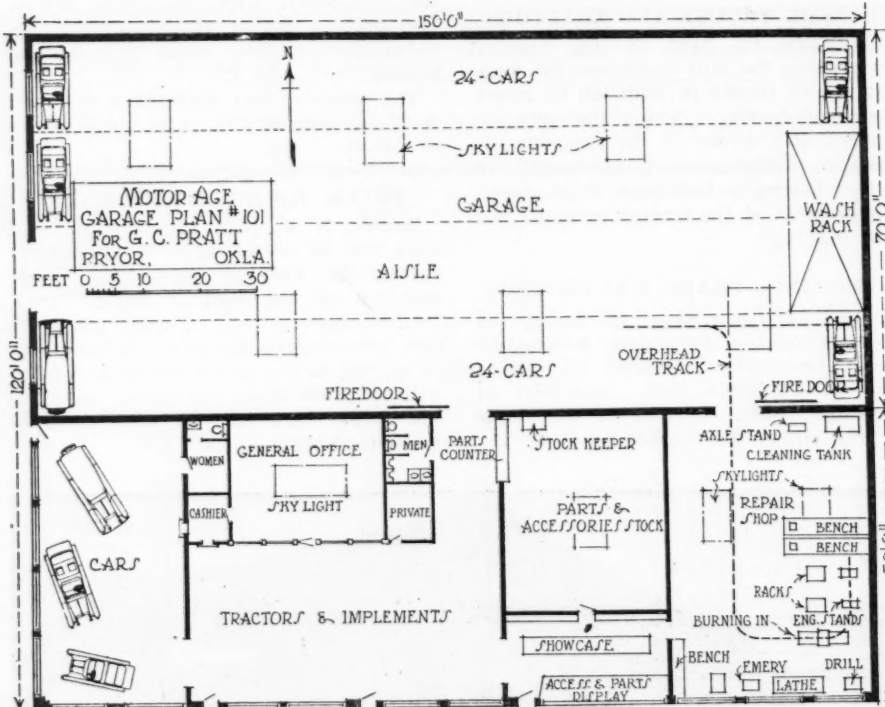
The Auto Inn, the Jay, Williams & Co. garage, is severely plain externally, but its plainness suggests efficient service



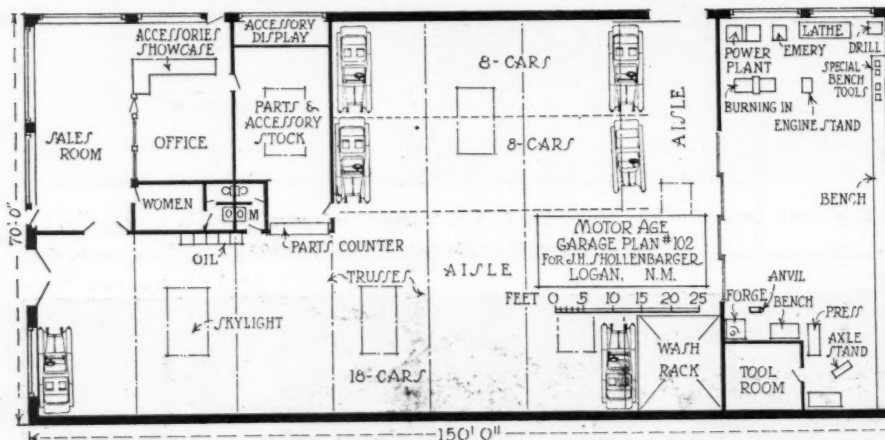
Each aisle of the garage run by Jay, Williams & Co. is lighted by a kind of one-sided monitor facing east

Garage Planning

Service Station Arrangements



Separating sales and service for G. C. Pratt of Pryor, Okla.



One-story garage for small town on a good highway

No. 101

Separate Sales and Repair

Q—We are in need of some plans for a garage and sales quarters. Our suggestion is for a building 120 by 150 ft. facing the south and west, the main front being the south. Our idea is to separate with a fireproof wall about 50 by 150 ft. for sales, parts and supplies, shop for cars and tractors and battery service. We desire to have an opening to the garage through the division wall that would enable parts and supplies to be retailed into the garage, this opening to be guarded by a fire door. One-story construction is what is desired.

We should like to know where we could obtain several plans to look over that would aid in concluding as to our needs. We would like to form a more definite

idea as to what we ought to have and then have an architect work up complete plans. Room for display of cars, tractors and heavy implements is desired.—G. C. Pratt, Pryor, Okla.

We regret to say that we know of no compilation of garage plans and doubt if you would find anything to suit your needs, should you come across such a collection. Every concern seems to need something different or thinks it does.

You might be able to get some suggestions from the MOTOR AGE plans already published, but your own notion of the garage and the sales and repair departments separated by a fire wall and fire doors seems too good to turn down.

It is our opinion that a garage, wherever possible, should be run entirely separate from sales and repair departments. It is better business policy and simplifies arrangement. We have set forth our ideas of the best way of handling your problem from the material you have given us and think you have a very fine layout.

The roof of the garage should be trussed, while that of the other departments may be trussed or not as desired, the shop having the only spans that need special attention. Arrange for plenty of skylight, as the central portions of the building are too far from windows to get any benefit. The garage need have no windows at all, skylights being much better.

In filling the garage to its capacity, it will be necessary to place two rows of cars on the north side; this usually can be arranged by giving the back positions to cars that come in early and go out late.

No. 102

Best Dimensions for Storage

Q—Publish plan for a practical one-story garage suitable for a small town on a good highway. We want small two-car show and sales room, office, accessory room, repairshop, washrack and all the up-to-date conveniences. Building will be lighted with 32-volt individual lighting plant. Corner lot location. Want to build the most practical width up to 75 or 80 ft. and any length up to 150 ft. Also show roof arrangement in detail. Walls will be 18-in. stone, rubble work, pebble dash or stucco outside. We want information as to roof arrangement, columns, etc., and their location, if used, also dimensions of I beams necessary over openings. We want entrance from both streets.—J. H. Shollenbarger, Logan, N. M.

You have given us so much rope we have had difficulty in avoiding the hangman's knot. Inasmuch as length does not make any material difference except in storage space in this garage, every 6½ ft. means storage space for three more cars in this case. We have accepted your maximum length of 150 ft.

Width, however, is quite a determining factor in the interior arrangement. A 50-ft. width is about the most economical, giving two rows of cars and an aisle between, while 55 ft. gives the same with a more roomy aisle.

It is always poor policy to have aisles with cars stored on one side only. Consequently, you can see that by adding enough to accommodate another row of cars, we have more than doubled the storage capacity of the garage.

We do not claim that 70 ft. is the best width in all cases, but in this particular case, where you want an entrance on both streets, 70 ft. seems the most convenient and economical of space.

In this plan, you can carry the whole roof on trusses built like those shown

in plan No. 87, or support the front and rear part on the partitions with trusses over the garage only. Steel trusses also may be used. In this connection, we cannot give you working details, as every job has to be figured individually for wind pressures, snow loads, etc.

There is no necessity of columns being used in this building. You can get the safe carrying capacity of I-beams from Keat's Engineers' Handbook, also the standard sizes. In figuring the weight of wall carried by a beam, it is only necessary to take a height equal to a third the span, if it is a solid wall, as the arching effect of the wall will support heavy walls, if they are braced in the center, until the mortar in the wall is thoroughly set. We do not advise overloading beams but only point to this to show that the wall supports itself above a certain point.

No. 103

Shop 70 By 30 Feet

Q—Furnish sketch for a shop 70 by 30 ft., showing the installation of bearing, burning-in machine, drill press, lathe, grinder and car arrangement.—Reader.

There are so many possibilities in a shop 70 by 30 ft., depending on surroundings, it is difficult to light on any one layout that would be best. We print several each week that seem best under the given conditions, and as you can see from our plans hardly any two are similar.

We always try to group the different machines where they will be somewhat secluded, that is, out of the way of the general working space, and at the same time convenient to a line shaft which is reduced to a minimum length.

An overhead track is a great labor-saver and when it can be extended to serve running-in and burning-in machines, engine stands, axle stands, etc., it not only saves backs but minimizes accidents from dropping. Machines and devices which do not need power best are placed handy to the points where their use is needed, but there is no great advantage in placing them with the power machines; though there is no disadvantage except congestion should they be too near.

Conditions in the layout we show are those most frequently met with, the shop being located at the back of the garage. We have left considerable space, X, at the right of the line shaft, where more special power machines might be installed as need demands it.

No. 104

Has Part Display Also

Q—We have secured the agency for the distribution of the Buick cars in three counties and expect to erect a modern garage at this point. We are sending you diagram of our plan, requesting that you give us what information you have at hand for the betterment of our plans. Our lot will be 80 ft. deep, facing good side street, with 96-ft. frontage on Main street. We will erect one-story brick building with entrance on both streets. We will have to have showroom for cars carried in stock, which will vary from time to time, say, an average of three to six cars will be all the space needed for this. A general repairshop for Buick cars strictly will be in the rear, office and parts room in front corner where streets intersect.—Bailey Bayol Buick Co, Demopolis, Ala.

We do not approve of the location of your offices in the most valuable display space in your establishment. There is no doubt but that much success is due to the display of goods in corner positions.

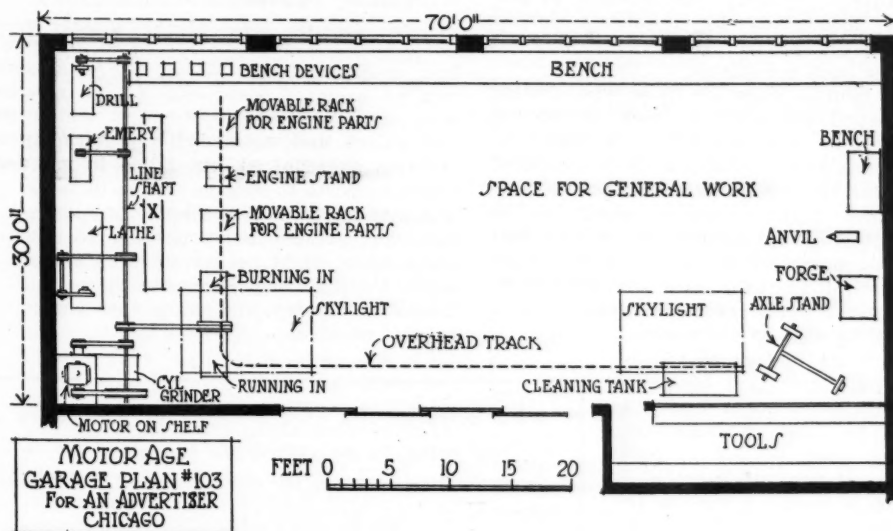
Your plan is so badly out of proportion that if it were warped into the right shape, the layout would not appear as it does now in any way. The shop, for instance, instead of being three times as long as wide, would be much wider and shorter in the proportion of 1 to 1½. The showroom also would be almost square instead of having twice as much frontage as depth. Always use a definite scale when making a layout to avoid fooling yourself.

We note that you have a large glass-enclosed room for parts, tires and tubes, with five glass showcases, but that you have no stockroom. A Buick distributor for three counties would certainly need an ample supply of parts, and we suggest you change this feature, especially considering your distance from the factory.

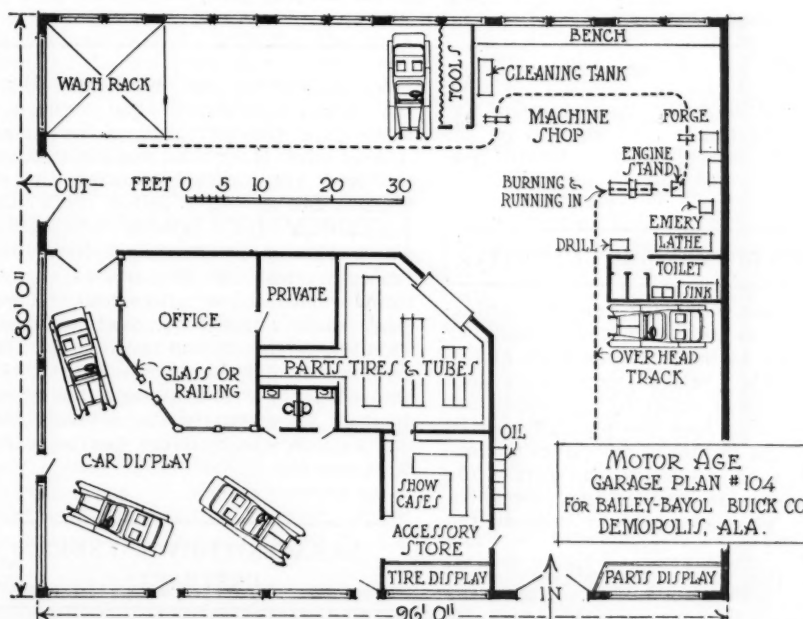
In an establishment the size of yours, we do not like the idea of the service room and the showroom all in one, as it practically is in your plan. In making a sale to a new customer, garage smoke, noise, confusion and a view of disabled cars of the same make are not psychological conditions favoring the sale.

While we sometimes counsel such an arrangement as you will see in No. 106, it is always because there is no alternative. We believe in all cases where sales are to be made, the salesroom should be removed as far as possible from the service. Just tell your customer about the latter. Many, in fact, most of the larger dealers here have the two departments divorced; many have them in separate buildings.

In our layout the small machine shop is ample, as engines and parts are removed from cars outside and carried to the shop on the overhead conveyor, instead of cluttering up the shop with the whole car. Minor repairs, as of springs, etc., are made outside.



Layout of shop, showing arrangement of equipment



Garage planned for distribution of Buick at Demopolis, Ala.

Law in Your Business

By Wellington Gustin



GUARANTEES BIND BUYERS, TOO

ERHAPS most people are skeptical of new machines, and new devices and fail to give such articles proper tests when sold under certain guarantees. The fault often lies in that the article fails to meet expectations aroused by the seller's too enthusiastic description. Many manufacturers, realizing this, attempt to protect themselves by requiring certain duties on the part of persons who buy under such conditions.

Of course, there are those who, dealing in worthless articles, seek to protect their own interests solely by many exceptions and loopholes in their contracts, making them read like some accident insurance policies which appear to be bundles of exceptions to escape loss. These, however, are pure frauds. They make it difficult for those who have meritorious articles, as it is often hard to draw the line of distinction.

It must be considered by the purchaser that his order entails an expense and outlay to the manufacturer which must be met in some way. If the purchaser is at fault, it means a loss to the manufacturer, while if the agreement is carried out on both sides, it will in theory at least benefit both parties. Hence a purchaser should not take his duties and obligations under a contract of sale lightly, and, if under the guarantee, certain definite things are required on the part of the buyer, he must legally perform them.

BUYER'S DUTY UNDER GUARANTEE

In a recent Oklahoma case, a manufacturer sued to collect on two promissory notes given as the purchase price of two valves. The valves were purchased through a local agent by the defendant, who agreed to give the plaintiff written notice of any failure of the valves to comply with their warranty, and permit the manufacturer to replace the valves before the purchaser should recover the money paid for the valves.

When the valves arrived they were placed on the defendant's machine by the agent, who failed to make them work successfully. Other efforts were made to no avail. The defendant then replaced his

S EEMINGLY knotty legal problems are constantly arising in the dealer's business, which even a slight knowledge of the law easily may solve. *Motor Age* in this and others of a series of articles will take up some of the most common legal problems which confront the dealer. Mr. Gustin, a member of the Chicago bar, not only is well versed in the law relating to the dealer but presents it in such a way as to be readily understood by the layman. In addition to his articles, Mr. Gustin will gladly answer such individual inquiries on knotty points as may be submitted him.

old valves and notified the plaintiff in writing, as required, but failed to make further efforts to get the valves to work. The manufacturer sent a letter of suggestions and printed instructions as to how the trouble might be overcome. The defendant felt he had given the valves all the test necessary, and shipped the valves back to plaintiff.

What responsibility does a dealer or garageman assume for negligence of his employees?

Have you any security for advances paid a salesman?

What is the interpretation of legal speed?

Can you protect the name of your firm as a trademark?

These and other questions are answered here this week.

In his defense the purchaser alleged that the manufacturer had refused to make good the warranty of the valves. Among other things the manufacturer introduced his contract showing the defendant had agreed to follow the written suggestions and printed instructions which should be furnished him for a thorough test if the valves proved troublesome, and if still unsatisfactory, other valves were to be sent and tried. This the defendant had failed to do. His own efforts and the agent's efforts were not sufficient to relieve him of his agreed duty as stipulated in his contract, and the decision was rendered for the manufacturer.

DAMAGES LIMITED UNDER CONTRACT

In another case, a man named Niles left a car for repairs in October, 1917,

with a company which agreed to do the work within a week or ten days. A few days afterward Adams, the plaintiff in the case, bought the car and notified the repair company he had bought the car. The defendant's agent renewed the promise to do the work within ten days, but delivered the car in January, 1918, although at the time Adams had arranged for the repairs he notified the company the car was to be used in the transfer business in Columbia, from which the defendant might be charged with notice of special damages that might result.

In attempting to show his special damages, however, the plaintiff testified he had never run a transfer and did not know the profits of the business. He said he thought a car running in good order could clear \$10 or \$15 a day. The court held this "was a mere opinion, based on nothing." A witness for Adams, who was in the transfer business, said that for three days he had rented his car to some drummers for \$15 a day. The court held that "those were exceptional days and could form no basis from which the rental value of an automobile could be inferred." Hence since there was no basis from which the damages were estimated, a judgment for damages in the lower court was reversed.—98 S. C. 380.

MUST PROVE BUSINESS LOSSES

In a South Carolina suit, the plaintiff sought to recover judgment on three promissory notes, aggregating \$500, given in part payment for a motor car. The car was in a defective condition. The agreed price was \$1,000, the seller guaranteeing to give the car a general overhauling and to replace certain defective parts.

The defendant claimed damages for the loss of profits to the failure of the car to run properly. On this point he testified that sometimes he would take in \$100 a week, of which about half was profit, and at other times there was little net profit. Reviewing this evidence, the court said there was no basis for lost profits in the case, as they were speculative entirely, and no recovery might be had for mere speculative profits.—Sotille-Cadillac Co. vs. Stokes, 98 S. C. 334.

MUST DENY PARTNERSHIP

In a suit in Georgia, on an account for goods furnished McCoy & Son as a partnership composed of father and son, the father denied there was such partnership, and the jury on the trial found in his favor.

Reviewing the evidence, the appellate court found it sufficient to authorize a verdict that the father had no interest in the partnership, but said it would stop him from asserting it against the plaintiff. For the father admitted that he learned in January his son was using his name and naming him as a member of the firm of McCoy & Son, and although he instructed his son not to use his name, he admitted he made no effort to publish in any newspaper he was not a member of the firm or to find out who the creditors of the firm were.

The goods were sold in March, April and May. The plaintiff's traveling salesman testified he sold the goods upon the faith of the father being a partner, and that at no time did he ever receive written notice the father was not a partner. In June, following sale of the goods, a notice of dissolution of the firm was published in the official organ of the county and was purported to be signed by both father and son. Considering all these facts and applying the law, as stated, the court held the father was estopped to deny the partnership.—98 S. E. 102.

DEALER MUST APPROVE CONTRACTS

In North Carolina an action was brought to recover a deposit of \$250 under contract, made by a dealer for the purchase of ten cars, two of which were delivered and eight of which were never delivered, although demanded. The contract was signed in Weldon, N. C., but was not to be binding until accepted by the defendant in Atlanta. When the duplicate of the contract was returned from Atlanta it had been altered materially, and the plaintiff would not accept the contract as altered, but demanded delivery upon the original contract.

Two months after the deposit was paid on the contract, and when dispute had arisen under the agreement, an agent was sent to adjust the difference. The agent declared one of the cars stipulated in the original contract would not be furnished, and the plaintiff thereupon demanded his \$250 deposit be returned. At the time the plaintiff made this deposit he had bought two of defendant's cars. Later he wired defendant to hold up shipment of the two cars, although he was not cancelling the contract. There was no evidence plaintiff ever recognized the amended contract. The cars delivered were paid for.

The jury found from the evidence that the contract had been altered by defendant without the assent of the plaintiff, therefore the deposit must be returned, because made under the contract which the defendant vitiated by its alteration. The company merely held the money without rendering any equivalent.—Har-

vel vs. Haynes Auto Co., Supreme Court of N. C. 98, S. E. 377.

WHERE PARTNERSHIP IS LIMITED

Limitation on partnership liability is given in an action by the Iroquois Rubber Co. against Ray Griffin and Stanley Mathes. The plaintiff sold Mathes & Griffin supplies amounting to \$513.67, on which \$148.06 was paid. Griffin was in the garage business, under the name of the Oakland Garage. Mathes was not in the garage business or connected with the Oakland Garage. The two defendants, however, did constitute the firm of Mathes & Griffin, agents for the Oakland car.

Action was brought against the partnership. Mathes admitted the partnership for the sale of cars, but denied it was for any other purpose, or that the supplies were furnished to the partnership. The denial also raised the issue as to whether the special partnership or business was such as to authorize Griffin to purchase supplies. Mathes denied knowledge of these purchases, and also denied they were received by him or his firm. Part of the orders were made on the firm letterhead.

The court found no evidence that the firm, as selling agents, repaired cars, had a place of business or used accessories. It said that in the absence of any evidence as to the nature of the business it cannot be assumed as a matter of law that a selling agent carried on repair work or has need for accessories. Especially would this be true where one of the partners in the selling agency conducts a separate and distinct business of garage and the other party never ordered or received the goods and had no occasion for them.

Mathes would be liable if Griffin's purchases were within the scope of his partnership agency, and not otherwise.

Concluding, the court said that a man who enters into a partnership for only one purpose is not liable for the purchases of the other partner, unless used in that business or the articles are of the kind usually and customarily bought for such an undertaking, existing or as represented to exist.—123 N. E. 369.

LIMITS EMPLOYER'S LIABILITY

In a case of negligence where a plaintiff's car, driven by his employee, was struck by a train at a public crossing in the State of Washington, the question of whether the contributory negligence of the driver who was on a pleasure trip allowed by the owner and who stopped at the railway station to receive an express package addressed to the owner of the car, without special instructions, could be attributed to the owner of the car became the deciding factor in the case.

The court announced the rule that where a master permits a servant to use a car for his own purpose, the servant is only a bailee, and where the car is dam-

aged by the negligence of a third person, negligence of the servant cannot be imputed to the master, regardless of whether in legal effect the car was hired by or lent to the servant. Where a master permits a servant to use a car for his own pleasure, the relation between them is merely that of bailor and bailee.

A judgment for the plaintiff for the injury to his car was affirmed.—181 Pac. 29.

MUST PROTECT SUB-AGENTS

In proceedings by Brokhausen against a motor company to recover an amount claimed to be due for commissions under a written contract of agency the Illinois appellate court ruled that under a contract of agency for the sale of cars wherein it is agreed that certain added commissions shall not be paid the agent until the latter furnishes satisfactory evidence to the principal that all commissions and added commissions, due or owing, the sublimited agents under the agent, have been fully paid or until satisfactory arrangements with the principal for insuring payment of such commissions to the subagents have been made, it is necessary that the agent prove he has furnished the principal satisfactory evidence that there was no commissions due the subagents or which might later become due to them or to prove satisfactory arrangements with the principal as to insuring their payment.—210 Ill. App. 418.

CONTRIBUTORY NEGLIGENCE IN ACCIDENTS

In an action for death of decedent, due to a car in which he was riding being thrown into railing of a city's bridge because of highway conditions, it was held to be proper to submit interrogations inquiring whether the driver at the time in question was approaching the bridge in a reasonably careful and prudent manner.

Where a passenger and driver of a car are engaged in a joint enterprise, the negligence of the driver is imputable to the passenger.

However, where one riding with another who is negligent in driving fails to require the driver to exercise proper care or fails to take other steps for his own protection this does not constitute contributory negligence as a matter of law.—Cram vs. City of Des Moines, Supreme Court of Iowa, 172 N. W. 23.

Where an aged lady started to walk across the street, saw car approaching, but thought she could get across in time and continued on so the car struck her a glancing blow as the driver turned to the right and ran on the sidewalk to avoid her, the pedestrian on account of her own negligence cannot recover even if the speed of the car was negligent.—Folwell vs. Demack Motor Car Co., Supreme Court of Louisiana, 81 S. R. 313.

The Readers' Clearing House

Questions and Answers

Noise in Clutch Rollers

Q—When the engine of this Overland 83-B idles there is a distinct knock in the clutch or universal. I do not hear it when I throw out clutch. What is the cause?

2—At what speed, or revolutions per minute, does it develop 35 hp?—J. G. Bennett, Oak Park, Ill.

1—From the description it is hard to say just what part of the gear is causing the trouble. The most likely place for this noise to develop is in the clutch rollers, but there are several other places where a similar noise might also occur. The universal joint might be worn, in which case the universal joint square has become worn. Fig. 3 shows the most likely place to look for the trouble. If the noise is being made by loose clutch rollers, the adjustment screws A should be tightened. But if the trouble is in the universal joint, a new cross or a new square will be necessary.

2—The Overland engine is a moderate-speed engine. For this model the peak of the curve occurs between 1700 to 1800 r.p.m.

Backlash in Differential

Q—Illustrate how to take up backlash in differential of Oakland 34-B. The rear axleshafts have about $\frac{1}{4}$ in. end play, which causes a popping noise when the car is in motion. How can this be adjusted?—Reader, Moyers, Okla.

The axle used on the Oakland 34-B is illustrated in Fig. 4. There is but one adjustment on this axle, and this can be reached without removing any part of the axle. It will be noted the pinion gear has an adjustment collar at the front of the gear. Turning this collar to the right moves the pinion gear into closer mesh with the ring gear. The small lock which holds the

Conducted by Roy E. Berg

Miscellaneous

THIS department is conducted to assist dealers, service stations, garagemen and their mechanics in the solution of their repair and service problems.

In addressing this department readers are requested to give the firm name and address. Motor Age reserves the right to answer the query by personal letter or through these columns.



Fig. 2—How to extend the front of the Ford car about 8 inches

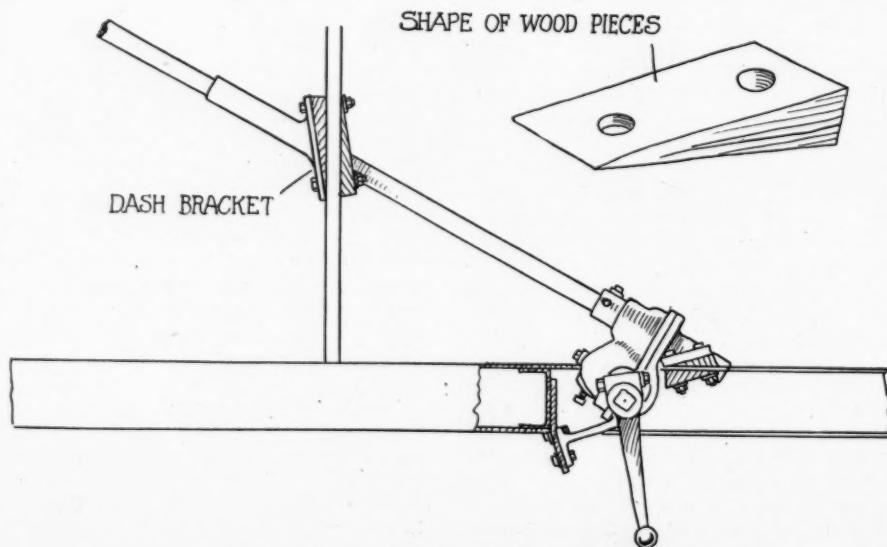


Fig. 1—Method of lowering the Ford steering gear

collar from turning after the adjustment is made requires that the collar have one of the tooth spaces opposite the lock so the finger from the lock will fit into the notch in the collar.

This will take up any excess lost motion in the gears, but we can not see where an excessive amount of play would cause a popping noise. It might be this noise termed a popping noise is caused by a broken tooth in the ring gear. Remove the rear cover of the differential housing and examine the ring gear. A noise of this nature would be produced only when the car is in motion and would have a thumping sound when the engine drives the car, and when the car is coasting with the engine being driven by the momentum of the car the noise would be more of a popping nature.

Lowering Ford Steering Wheel

Q—Publish drawings showing how to extend front wheels of a Ford 8 in.

2—Publish diagram for lowering Ford steering post.—D. C. Thompson, Butte, Montana.

1—This is shown in Fig. 2.

2—This is shown in Fig. 1.

Increasing Speed of Car

Q—Desiring to increase the speed of a Jeffery touring car, model 6-71, what in your opinion is the best way of getting results?

2—By increasing the speed, would the pulling power of the engine be reduced?

3—Do you advise doing it?—George Radulic, Chicago.

1—The first thing to do to increase the speed of a car is to go over every unit and make sure each is functioning properly, that is, that the compression is right, the cylinders free from carbon, the rings tight, the valves ground. There should be tight bearings in the engine, backlash should be taken out of all the power-transmitting members from the engine way back and through the drive wheels, all wire connections should be gone over to see that they are clean, spark plugs must be in good condition and the points properly set, about $\frac{1}{32}$ in. apart, and the ignition source should be in tiptop order, whether magneto or battery system. It will be found, after going over all these parts, the carburetor may be properly adjusted but hardly before the other things are right.

If this does not give the required speed, then it may be possible to change the gear ratio by putting in a larger drive pinion and new ring gear in the differential housing. But this will call for considerable work and no little expense and is not to be advised until it is known that the things suggested have been followed out. It would not pay to try to change the valve setting, for this means a new and different camshaft.

If the compression is low, then perhaps it will be well to have the cylinders

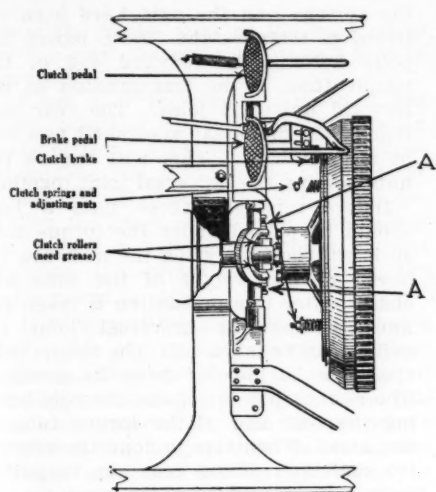


Fig. 3—Adjustment of clutch on the Overland 83-B

reground, new and oversize pistons and ring inserted. Lapping in the new pistons and rings, as told in Motor Age of Aug. 28, materially will increase the compression and improve the running of the engine, so by the time all the suggestions have been followed it is likely the car will have about all the speed desired.

2—If the speed is increased by raising the gear ratio through fitting new pinion and ring gear, it will reduce the available pulling power but will increase the speed.

3—We would suggest following out the ideas incorporated in the first answer, leaving the gear ratio alone to save a great deal of work and expense for very little results.

Water Injection Tests

Q—How much water or water vapor must be taken in through the intake of a Ford car to be effective against the accumulation of carbon? I have a quart jar connected to the intake by a rubber tube so air is drawn through the water in the jar and the water evaporates at about a quart a week.—Allan Helm, Rockford, Ill.

The latest and most complete report on water injection was made by the Bureau of Standards, the test being made to determine the validity of the claim that water injection reduces the carbon deposition. In substance, the result of the test was that no appreciable effect is produced upon the power, fuel economy and general operation of a gasoline engine by the injection of water into the cylinders at rates varying from 0.03 to 0.44 lb. per brake-horsepower-hour.

When water is injected at rates higher than 0.44 lb. per brake-horsepower-hour there is an appreciable decrease in the power output, fuel economy and smoothness of operation. It is quite probable that in a badly carbonized engine, or an engine of defective design, in which there are hot spots that cause preignition, the injection of water results in an increase of power. In an engine operating at high water jacket temperature, the injection of water in amounts between 2 and 8 lb. per hour produces a softening and a

To assist readers in obtaining as a unit all information on a certain subject MOTOR AGE segregates inquiries in this department into divisions of allied nature. Questions pertaining to engines are answered under that head and so on.

MISCELLANEOUS

J. G. Bennett.....Oak Park, Ill.
Reader.....Moyels, Okla.
D. C. Thompson.....Butte, Mont.
George Radulic.....Chicago
Allan Helm.....Rockford, Ill.
R. C. Stark, 555 Tire Service Co.
.....Little Rock, Ark.
H. Myers.....Lansing, Mich.
Robert Staunton.....Indianapolis, Ind.
O. E. Bottom.....Pomona, Mo.
J. A. Hutchins.....Austin, Tex.
Morris Adler, Adler-Moller Co....
.....Quincy, Ill.
Charles M. Clark.....Jackson, Mich.

ENGINES

Rex Smith.....Fort Wayne, Ind.
J. W. Wells.....Middleport, Ohio
H. C. Babbitt.....Virden, Ill.
R. H. Brown.....Detroit, Mich.
Daniel E. McCauley.....Ironwood, Mich.

THE ELECTRIC SYSTEM

C. J. Cottrill.....Milwaukee, Wis.
E. Pentland.....Chicago, Ill.
E. H. Jackson.....Ponca City, Okla.
R. H. Brown.....Detroit, Mich.
F. B. Story, Motor Inn Garage....
.....Winnett, Mont.
Luis G. Sada.....Monterey, Mexico
L. Shepard, Clark & Shepard Gar-
age.....Hopkinsville, Ky.

No communication without the writer's name and address will be answered in these columns.

slight reduction of carbon, this reduction not exceeding 25 per cent and being most noticeable on the piston heads and valves. However, water injection at the maximum rate also causes a considerable reduction in power development.

The preceding paragraph no doubt explodes the theories held by many in regard to vaporizers and water injection devices. However, this test, it will be noted, was made with gasoline. For

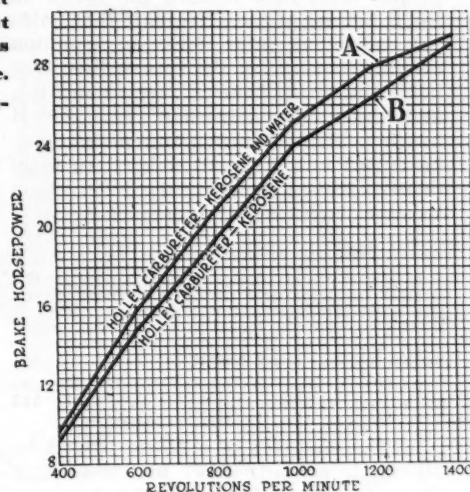


Fig. 5—Curve showing results of water injection test

kerosene the aspect of the problem changes slightly. The curve in Fig. 5 shows the result of a test made on a 4 by 5½-in. truck engine. The curve A represents the data secured with water injection and B without water injection.

Tearing Down Rear Axle

Q—Explain how to tear down the rear axle and driveshaft of a 1914 Hupmobile 32.—H. Myers, Lansing, Mich.

To tear down the rear axle and driveshaft of a 1914 Hupmobile proceed as follows: With the chain fall attached to the frame at rear end raise the car until the rear wheels are clear of the floor. Remove the axle driveshafts and wheels. Disconnect the rear cross spring and shackle ball on right and left sides. Disconnect the shock absorber and service and emergency brake control rods, and remove the cap screws that hold the housing of the front universal joint to the gear case, after which the entire rear axle assembly may be slipped out from under car.

The torque tube, which includes the driveshaft, pinion and bearings, may be unscrewed from the housing after loosening the clamp bolt on the top and bottom.

The rear axle housing can be separated in the center by removing the eighteen 7/16 hexagonal head cap screws at the left side of the housing. This will give access to the ring gear and differential carrier and thrust bearing.

To disassemble the driveshaft and

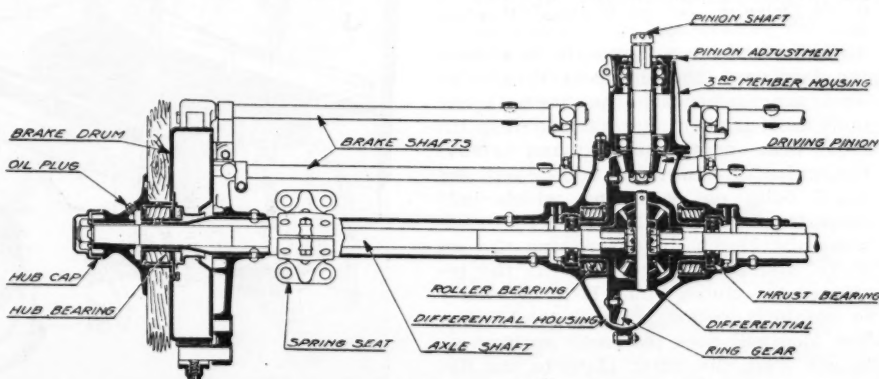


Fig. 4—Rear axle on Oakland 34-B, showing adjustments

torque tube, first remove the screw in the front end of the driveshaft that holds the universal joint fork or trunnion on the front end of the torque tube that holds the thrust bearing race in position, and the entire driveshaft with thrust bearing, Hyatt bearing and pinion may be drawn out the rear end. Care must be exercised in removing the drive pinion to avoid damaging the teeth of it.

Mileage with Oversize Tires

Q—How much difference is there in the actual mileage and mileage registered on the speedometer after changing from 32 by 3½-in. fabric tires to 33 by 4-in. cord tires and from 33 by 4-in. fabric tires to 34 by 4½-in. cord tires?

2—What size sprocket should we use to adjust speedometer?—R. C. Stark, 555 Tire Service Co., Little Rock, Ark.

1—The diameter of a fabric tire 32 by 3½ in. is actually 32.61 in., and of a 33 by 4 in. cord 34.55 in. The diameter of a 33 by 4 in. fabric tire is 33.44 in., and of a 34 by 4½ in. cord tire is 35.59 for the ribbed tread. In the first instance the ratio of the two sizes is 1 to 1.058, and in the second case the ratio is 1 to 1.063. This ratio means that in the distance of a mile the smaller tire will revolve a certain number of times and the larger sized tire the same number of times divided by the denominator of the ratio. This is, in the first case the 32 by 3½-in. tire will revolve 618 times, while the larger cord tire will revolve 618 divided by 1.058, or 584 times. In the second comparison, the 33 by 4 in. fabric tire will revolve 602 times, while the oversized cord tire will revolve 602 divided by 1.063, or 566 revolutions, in a mile.

The speedometer record with these oversized tires will be affected to the following extent: For every mile the speedometer registers the car will have traveled 1.058 miles. This is for the first case. In the second instance the actual mileage will be 1.063 miles for every mile indicated by the speedometer.

2—The sprocket for the speedometer, provided that the Stewart meter is used, should have twice as many teeth in it as the wheel diameter measures in inches. For your case the first assumed tire size should have the wheel equipped with a 69-tooth gear. For the larger sized tire the wheel should be fitted with a 72-tooth gear.

Removing Clutch and Flywheel

Q—Give instructions as to removing and replacing clutch and flywheel in Saxon Y-18-T.—O. E. Bottom, Pomona, Mo.

First of all, it is necessary to remove the floorboard from the front of car, also dust pan underneath the flywheel and clutch. It is then necessary to drop the cross beam or the support and remove the universal joint by taking out the small bolts on each end which hold same in position. Then proceed to remove the clutch by unscrewing the set screw and retainer screw from the inside of the clutch hub. It is necessary to obtain a socket wrench to do this. You also will note the small springs attached from the outer plate to the flywheel. Loosen same, and then you will

be able to pull the clutch from the flywheel.

To remove the flywheel, it is necessary to loosen the four bolts inside of the flywheel hub. To replace the clutch, one must be very careful in drawing up on the retaining screw and the set screw before tightening the set screw. Great care must be taken to adjust the retaining screw so only a very slight play in the clutch is felt.

Play in Propeller Shaft

Q—Instruct how to take up play in propeller shaft between the clutch and transmission on a Stutz 1913 4-B.—Robert Staunton, Indianapolis, Ind.

The play between the propeller shaft and clutch no doubt is caused by a combination of things. No doubt, the universal joint coupling shaft pins and blocks are worn, and it is also possible the yoke of the propeller shaft may be loose. Some of this play may be in the transmission gears themselves. However, we are inclined to believe from previous cases that most of the looseness is caused by a worn universal joint. In this event a new set of bushings on the cross of the universal joint will remedy the trouble.

Adjusting Rear Wheels

Q—Explain method of adjusting and disassembling rear wheels on a Buick E-45.

2—How much grease should be used in repacking the front and rear wheel axles?

3—How may service brake drag at edge of band be eliminated? This seems to be a characteristic defect among many cars of that make.

4—How may grease leakage be prevented at the top of the pinion driveshaft?—J. A. Hutchins, Austin, Tex.

1—A very good illustration of the rear axle used on the Buick with detailed inserts is shown in Fig. 8. If it is your desire to remove the rear axle completely, a chain fall should be used to hold up the rear end of the car after

the springs and the axle have been relieved of their weight. Then loosen the bolts holding the forward end of the torque tube to the transmission at the forward universal joint. The rear section of the universal joint shell now can be slipped back. This will expose the nuts holding the universal joint together.

Before removing these nuts a jack should be placed under the torque tube so it will not fall when the nuts are relieved of the weight of the tube and shaft. After this precaution is taken the nuts holding the universal joint together can be taken off. The torque tube then can be lowered from its position. The next step is to remove the nuts holding the rear end of the torque tube to the axle. When this is done the propeller shaft and pinion gear can be pulled from engagement with the ring gear.

The brake clevises should be disconnected, as well as the bolts holding the springs to the spring seats. The wheels now can be rolled away from the chassis, and the rear end of the car will be supported by the chain fall.

With the axle free the rest of the disassembling is easy, for all the parts are now extremely accessible. Adjustment is a matter that requires some care. With the rear cover removed from the differential housing, the oil and grease should be thoroughly removed before an adjustment is attempted. The pinion gear has a small removable cover which when removed exposes the adjustment collar. The other adjustment is with the ring gear, and this can be seen on each side of the gear. The first adjustment of the gears should be approximate, and the teeth of the gears should mesh so the back edge of the teeth form a straight line, that is, the pinion gear should not be set into the ring gear, or the ring gear should not be set away

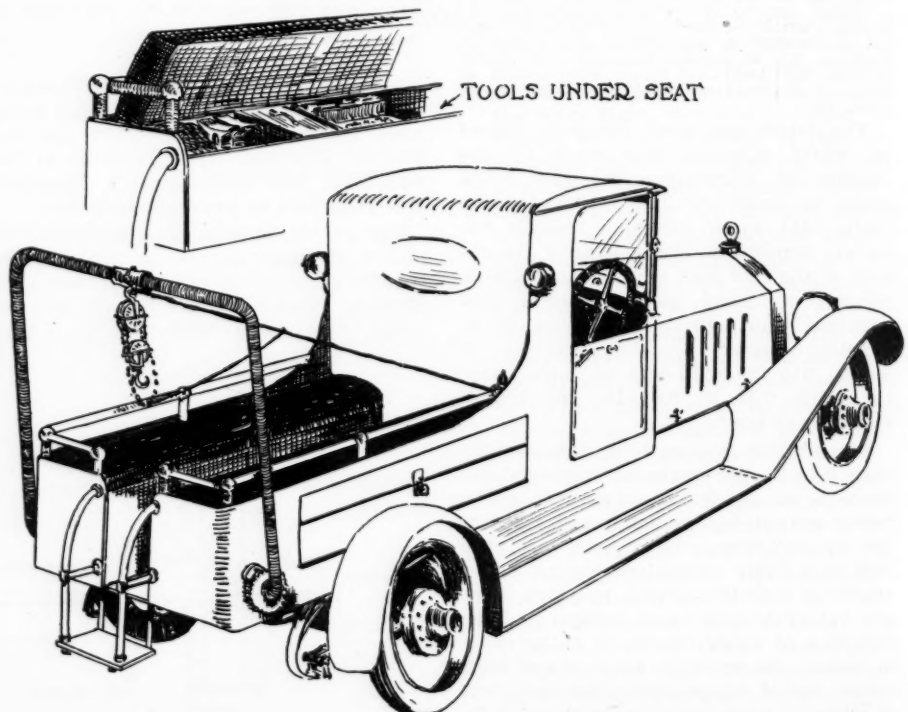


Fig. 6—Suggestion for converting old Cadillac into service car

from the pinion gear so the back edges of the teeth do not line up and form a straight line.

When this approximate position has been obtained, the exact setting is an easy matter. A piece of wrapping paper should be run through the teeth of the gears. If this takes up all the play between the gears so the ring gear cannot be turned a noticeable amount without turning the propeller shaft, then the adjustment is right.

It is a good thing to remember that a car with an inclosed propeller shaft will not have the noise or the hum of the differential gears deadened by filling the differential with heavy oil or grease. The torque tube makes an excellent amplifier for the vibrations as they are transmitted through the shaft, the clutch and to the transmission housing.

2—The amount of grease used in the wheel hubs is not very large, amounting to less than a pound. The idea is not to put in a definite amount according to any prescribed quantity, but to fill the bearing completely. The wheel should be jacked up and turned on its bearing, and then more grease should be forced into the hub. A grease gun is the best device to fill the hub with, for when the hub is filled and the grease gun is removed the grease under the compression pressure will be forced out through the hole when the hub is filled completely.

3—This drag is taken up by turning the adjustment screw at the rear of the brake band. The band and the brake should have a clearance of 1/16 in. all around the brake drum. The cap screw adjustment gives this.

4—It is rather hard to say just what is causing this leakage. The rear axle is a complete assembly, and the parts are made to fit tightly without the use of gaskets between the riveted sections. It is possible the drive assembly may have received a jolt that has loosened the

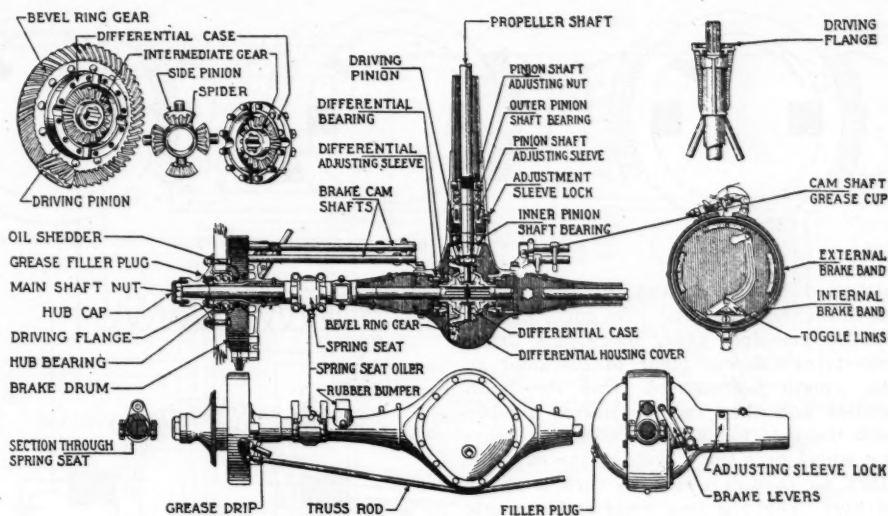


Fig. 8—Rear axle on E-45 Buick, showing adjustments

tube joints. Perhaps the small cover over the pinion gear adjustment is not tight and thus allows the grease to leak out. Perhaps the question is not fully understood, and the grease, instead of leaking out differential housing, is leaking by the pinion shaft and into the torque tube. If this is the case, an adjustment of the forward bearing of the pinion shaft, together with a renewal of the felt washer, will end the leakage.

Building a Service Car

Q—We are contemplating converting a model 14, five-passenger Cadillac into a service car. Instruct and illustrate how to cut down the wheels.—Morris Adler, Moller Co., Quincy, Ill.

Cutting down the wheels of a car is a wheelwright's job, but a capable wagon maker ought to be able to perform the operation. It probably will save time and expense to send the set of wheels to Chicago or St. Louis and have the job properly done. It will be necessary, of course, to fit a new felloe and new rim for each wheel. By using smaller wheels you will reduce the speed somewhat but at the same time will increase the pull-

ing power of the car, which is to be desired if it is to be used as a wrecking wagon.

If the car is to be used for service only, it will not be necessary to cut down the size of the wheels. Reducing the size of the wheels has the effect of lowering the gear ratio.

In building a service car and combining with it the wrecking features, it will be well to fit it out somewhat along the lines shown in Fig. 6. This can be done by cutting off the body back of the front seat and fitting on either side of a locker about the height of a seat and perhaps 18 in. wide and running up to and joining the back of the front seat. Brass or iron rails can be attached to the lockers to serve as backrests and safety rails, besides improving the appearance of the rig. The lockers will accommodate all sorts of tools, tow rope, chains, jacks, blocks for jacking up the car, rollers, etc.

On the back end of the car should be a rear step as a matter of convenience and also a rigging to serve as a hoist. This can be made up of heavy gaspipe and arranged to hinge at either lower end where it is to be attached to the floor of the car at the extreme end. Well forward in the car, between the two lockers, can be attached a small windlass to be used to operate the chain hoist. The latter can be attached to the upper part of the crane, and with a differential hoist one end of any wrecked car can be suspended so it may be towed into the shop.

It may be well also to house in the driver's seat so in bad weather the operator will be protected from rain or cold. A wrecking car should have not only ample power to use for towing but sufficient speed to make a reasonably fast run in case of an accident where, possibly, somebody has been pinned under the car.

Play in Steering Gear

Q—Instruct how to take up play in the steering gear of a 1917 Studebaker six roadster.

2—Did Henry Ford ever make a car other than a four-cylinder car?

3—What does a manufacturer mean when he speaks of his cars as being custom built?—Charles M. Clark, Jackson, Mich.

1—The Studebaker steering gear is il-

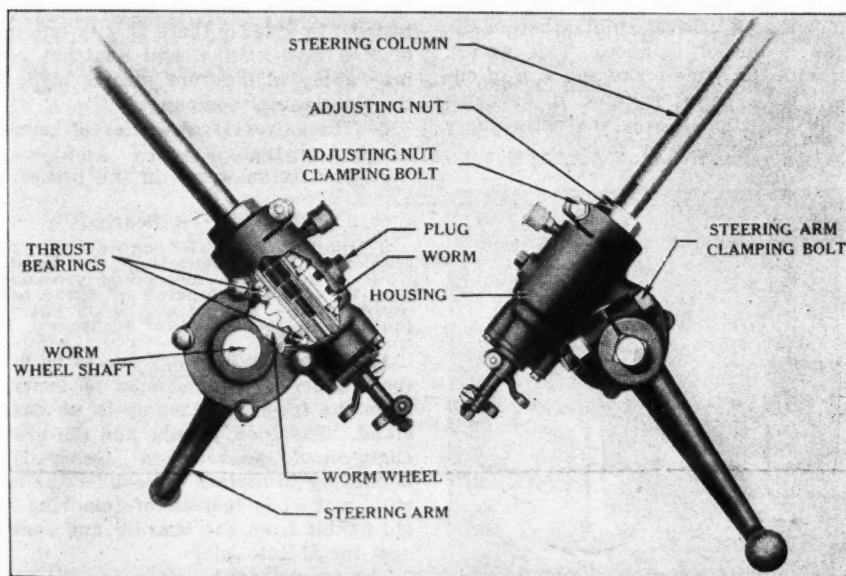


Fig. 7—Steering gear on 1917 Studebaker, showing adjustments

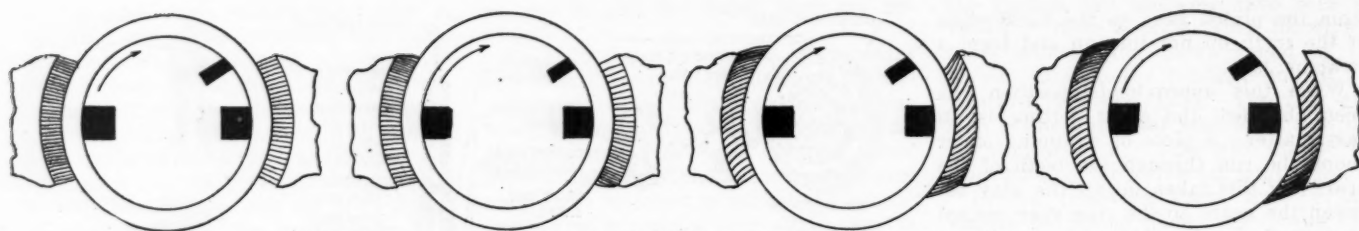


Fig. 9—Diagrams illustrating the principle of the third brush described in text

illustrated in Fig. 7, and the position of adjustment is shown. To correct play in the steering gear, block the front wheels of the car clear of the floor so the weight is removed from the front wheels and they can be moved readily with the steering wheel. With the steering wheel turn the wheels to the extreme right as though about to turn a sharp corner. There is less wear at the angle positions than at the straight-ahead position, and a tight adjustment straight-ahead probably would be a binding adjustment in the angle positions.

In the extreme position work the steering wheel slightly to ascertain the amount of backlash or lost motion. If the steering column moves up and down, loosen the clamping bolt in Fig. 7 and slowly turn down the nut until all the end play is eliminated. Then tighten the clamping bolt. If lost motion of the steering wheel is still excessive, examine the cross tube and reach rod connections for wear, also steering arm, as it may be that it is loose on the worm-shaft.

If this does not prove entirely satisfactory, it is an indication the teeth on the worm wheel and worm gear are worn. This can be corrected immediately by turning the worm wheel a quarter way around, thus presenting new sets of teeth to engage with one another on both the worm wheel and the worm gear. This adjustment can be made as follows: Loosen the clamping bolt, Fig. 7. Remove the steering arm. Turn the steering wheel a quarter around and replace the steering arm and clamping bolt. This will present the engaging of entirely new sets of teeth on worm wheel and worm gear. It is not advisable to try to adjust the steering wheel absolutely without backlash. Too much rigidity will result with undue wear and with unnecessary difficulty in steering.

2—Yes, the Ford Motor Co. make a six-

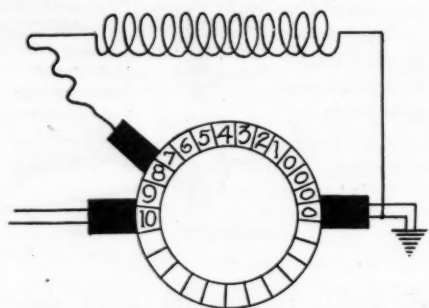


Fig. 10—Layout of third brush regulation

cylinder car. In design, the six was very much similar to the present four. The ignition was by six separate battery coils, just as the present car has four coils.

3—A custom-built car is one where the body is made to meet the individual demands and tastes of the purchaser. In general, this is the full extent of a custom builder's purpose.

Engines

Vibration in Engine

Q—A 1918 model 85 Overland seems to be in practically perfect condition except there is so much vibration in the engine. When running along at 15 m.p.h. can hardly feel the engine but as soon as I go beyond that the vibration gets so it feels as though the car is going to pieces. The engine seems to be fastened good and tight but it does not seem that there is where the trouble is.—J. W. Wells, Middleport, Ohio.

Vibration may result from several causes, and naturally the greater the speed of the engine, the more it will be noticed. At the same time do not overlook the fact that all engines have what is known as a critical point, wherein the engine is out of balance. This varies, even with the same make and size of engine. With some engines it develops around 25 m. p. h., whereas with others it will run up to 30 or 35 m. p. h.

It will be necessary to go over your engine with care, to know the main bearings and connecting rod bearings are true and tight and that no one piston assembly outweighs the others, otherwise, it is easy to understand this will cause the engine to be out of balance, with vibrations as a result.

It is possible that at 15 m. p. h. the engine fires practically perfectly, whereas it would be possible that the ignition can be so out of order that one cylinder might be misfiring at speeds beyond 15 m. p. h., and this, again, would cause the engine to give forth vibration.

Make sure every engine bolt is tight, that the flywheel is tight and also that the nuts holding the cylinders to the crankcase are set down thoroughly. There have been many cases wherein one of these things has caused vibration, and the writer has just gone through the experience of finding a loose engine bolt that was causing vibration and numerous other noises at the same time.

Red Seal Engines

Q—Does the Continental Motors Co. make more than one type Red Seal engine?

2—What is meant by 6-N, 7-N, 8-N and 9-N Red Seal?

3—Which is considered the best Red Seal Continental engine made?—H. C. Babbitt, Virden, Ill.

1—The term "Red Seal," referring to Continental engines, is greatly misunderstood. Where a red seal is placed on an engine it is a guaranty that that particular engine has undergone the closest inspection and is a top-notch product. It means that it has passed the strictest examination all through its travel from the beginning until it has been finally tested. In a sense there is only one type of Red Seal engine, and yet that term may apply to different models made by the Continental company.

2—These represent different models or sizes or types.

3—This is answered in the preceding.

Fitting New Bearings

Q—In refitting an engine with new crankshaft and connecting rod bearing, what is the proper method of procedure?

2—What causes binding of a rod bearing part way around the shaft but free the rest of the way?—R. H. Brown, Detroit.

1—When new bearings are to be fitted the engine, of course, must be removed from the frame and set up in an engine stand. The rods, pistons and the crankshaft should be removed. Generally it is cheaper to replace the connecting rods with new rods instead of removing the old babbitt from the bearing and casting new metal into place.

The crankshaft bearings are the hardest to fit properly. The stud bolts which

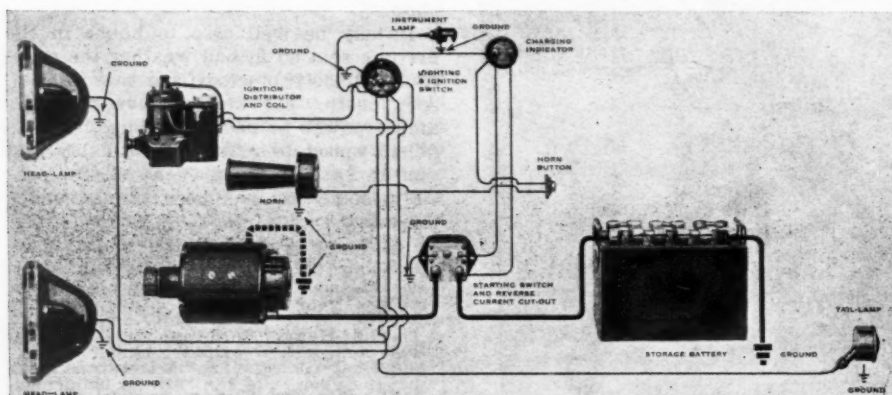


Fig. 11—Wiring diagram of 1919 Dodge Brothers car

hold the bearing into place should be removed, and this allows the bearing box to be removed. New metal can be poured by making a wooden core or preferably, a metal one, slightly undersized in diameter and fitting this to the center of the bearing box. Metal can be poured into the space between the core and the box. When all the boxes are rebabbited they should be replaced and an approximate fitting of the shaft should be made by determining how the timing gears fit. If the gears fit near their pitch lines, then the bearing can be fitted by scraping, but if the teeth of the gears are widely separated, then the bearing should be re-bored, and then the scraping process can be applied.

2—This binding is caused by the elliptical shape of the shaft or the connecting rod bearing. Generally the bearing of the rod is the trouble maker, but some part of the binding action also can be attributed to crankpin bearing. First, the crankpin bearing should be ground round by the shaft in a lathe on an offset chuck. The correct setting of the shaft should be checked with a gage before the grinder is applied, because the condition of the shaft will be made worse if an exact setting is not secured. The gage should register the variation of the elliptical shape of the shaft and not any variation that would be caused by an eccentric setting.

When the crankpin bearings are ground perfectly round the connecting rods should be fitted to the shaft while the shaft is out of the engine. In this way, with the shaft perfectly round, any binding action immediately can be detected in the rod, especially if prussian blue or lamp black is applied to the bearing before it is tightened on the shaft.

Fitting Piston Rods

Q—Why do some garagemen shim up cylinders? What does this do, increase or decrease power?

2—How much of a shim would I have to put between cylinder bottom and crankcase to notice a change in power?

3—What is the only correct and proper way to fit piston rings? Could I put oversize rings on a regular piston?

4—How could I tell if I had enough clearance between piston and cylinder wall?

5—How are pistons lapped in?

6—What is the best way to fit connecting rod bearings on the White 1½ to 2-ton truck, 1917 model?—Daniel E. McCauley, Ironwood, Mich.

1—It is not often that a repairman resorts to shimming up a cylinder or a cylinder block, whereas sometimes the

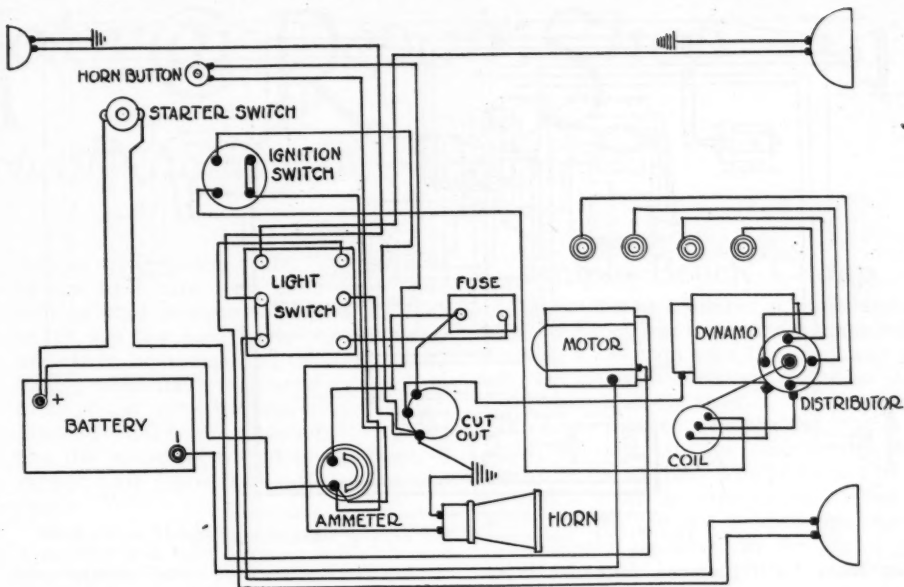


Fig. 13—Wiring diagram of the Monroe M-2 car

cylinder may be lowered slightly to increase the compression. An off-hand answer would be that this would decrease the power of the engine by lowering the compression, yet it might be possible to improve the running by so decreasing the compression, inasmuch as it might make for smoother action and take away a possible tendency to knock through having, in the beginning, too high compression. Yet this is far from likely, for the matter of compression is too well understood nowadays for the designers to make a very serious mistake in this particular matter.

2—Without further knowledge of the condition of your engine and what you desire to accomplish we should not feel competent to advise that this be done. Raising the cylinders 1/16 in. would make a perceptible difference ordinarily, and yet this will depend upon what the compression now is and also in what condition the other parts are.

3—The subject of fitting piston rings was thoroughly treated in Motor Age Aug. 28, and if this is followed, good results will be obtained. As to whether it is advisable to merely fit new rings will depend upon the condition of the cylinder walls. Where the cylinders are out of true new rings will do little good, inasmuch as they cannot readily accom-

modate themselves to untrue cylinders. Far better results will be had by having the cylinders reground and oversize pistons and rings fitted, as suggested in the Aug. 28 issue. If, however, the cylinders are practically true, then it will pay to lap in new rings.

4-5—See the preceding and also the issue of Aug. 28.

6—It will be best to obtain from any White agent or from the factory at Cleveland, Ohio, direct, a set of bearings for this particular truck model engine. Fitting the bearings then becomes a rather fine job to bring best results. It will be easily understood how the new bearing pieces are attached to the connecting rod caps, and after this has been done the work of scraping in the bearings comes and this is a tedious but not difficult job. The more careful work put in, the better the results and the longer the bearings will last. This was exhaustively treated in Motor Age June 27, 1918, with illustrations that served to make the entire operation clear.

As will be seen when the engine is torn down, there are shims on either side of the crankshaft between the connecting rods and the caps and these should be ordered when the new bearings are sent for. A bearing scraper will have to be procured. This can be had at any supply house.

It is common practice to cover the crankshaft with prussian blue and then bolt up the cap to the rod end over the crankshaft, with an equal number of shims on each side and at least 3/32 in. thick in the total. By turning the rod around the shaft the prussian blue will be worn off where there are high spots in the metal. These should be shaved down slowly and carefully with the scraper, being careful that not too much metal is taken off. Then the blue is applied again, the cap and rod set together again around the shaft, and another turn is made. This will reveal more bare spots, which must be shaved down ever so little at a time. This operation is

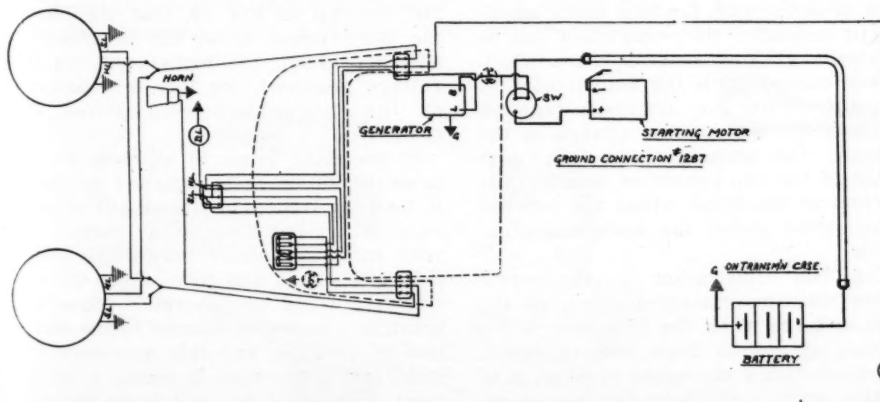


Fig. 12—Wiring diagram of 1915-1916 Chandler car

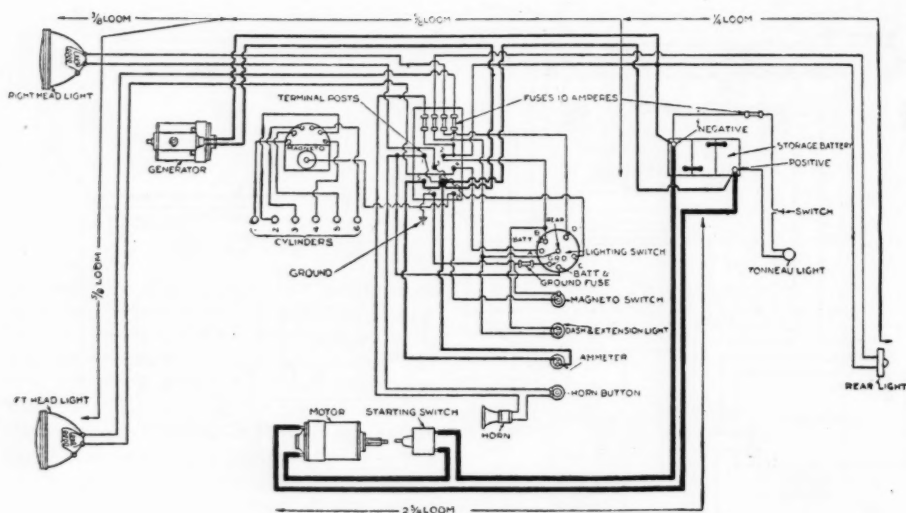


Fig. 14—Wiring Diagram of the Jeffery Chesterfield six

necessary until there is an exact evenness over every part of both bearings.

It will be necessary, of course, to anchor the bearing to the rod and cap, as was the practice in the first place, and it also will be necessary to cut exactly similar oil grooves so lubrication may be complete. While you are at it, weigh each assembled connecting rod so all will be alike, otherwise the engine cannot run smoothly. In case there is one rod that is a trifle heavier than the others, it is a small matter to file off a little metal to bring it to correct weight, that is, metal off the main portion of the rod.

The Elecric System

Wiring of 1915 Chandler

Q—Publish wiring diagram of the 1915 Chandler.—C. J. Cottrill, Milwaukee, Wis. The diagram is shown in Fig. 12.

Wiring of Jeffery Six

Q—Publish wiring diagram of the Jeffery Chesterfield six.—E. Pentland, Chicago.

The wiring diagram of this car is shown in Fig. 14.

Wiring of Monroe

Q—Print a wiring diagram of lighting and ignition for a Monroe M-2.—E. H. Jackson, Ponca City, Okla.

The wiring diagram for this car is shown in Fig. 13.

Electric Regulation on Dodge

Q—What method of regulation is used and is a cut-out employed in the starting and lighting system used on the new model Dodge Brothers car?

2—Is the generator used as a motor in starting the car?

3—Publish wiring diagram of this system.—R. H. Brown, Detroit.

1—The familiar third brush regulation is used on the generator of the Dodge Brothers car. A cut-out is used to throw the generator voltage in on the line when operating at a speed over 9 m.p.h. A cut-out is an essential part of any battery generator system, for if a cut-out were not used, the battery would discharge through the generator when the generator is standing still or operating at speeds under the necessary speed required to produce a pressure slightly over 12 volts.

2—The generator and motor are combined in one unit.

3—The wiring diagram for the Dodge Brothers car is shown in Fig. 11.

Third Brush Characteristic

Q—The Delco generator on a Buick model E-45 will charge from 10 to 12 amp. at 15 to 20 m.p.h., and when running from 30 to 40 m.p.h. the charge falls back to 6 and 8 amp. What causes this?—F. B. Story, Motor Inn Garage, Winnett, Mont.

This decrease in output at the higher speeds is an inherent characteristic of the third-brush regulation scheme. The regulation obtained from the third brush is dependent upon armature reaction, which in turn is caused by the shifting of the field flux around the commutator. This piling-up effect of the field flux is illustrated in Fig. 9. The first diagram shows the normal position of the lines of force produced by the generator field when the armature speed is slow just after the point of generator cut in. As the generator speeds up, the lines of force tend to follow the armature around as it rotates. This causes the magnetic lines to crowd closer together at the pole tip at the point where the armature passes out from under the pole. The second diagram in the series shows this. Still higher speed produces a greater crowding of the lines of force at the pole tip. The effect of this crowding together is in a way the effect that would be produced by decreasing the voltage impressed across the shunt field.

Now instead of connecting a resistance in series with the field and controlling it manually, the same effect can be obtained by using a third brush which makes contact with the commutator at a point where the armature reaction will produce the greatest change in the voltage. This position will be found near either of the two generator brushes just in front of the brush where the commutator passes under the main collecting brush.

The last illustration in the series shows the approximate position of the lines of force when the generator is revolving at a very high rate of speed, approximating a car speed of 60 m. p. h. In this position the field flux has so reacted with the normal flux produced by

the armature itself that an intense cross-magnetizing field is produced, which is so strong as to completely distort the lines of force of the field. With the lines of force in this position the voltage impressed across the shunt field is very small, producing, of course, a very much smaller output.

Trouble Probably in Wiring

Q—This 1917 Ford ran fine for six or eight months. Then it began to jump as though it had broken porcelains. I put in new plugs, had the same trouble; put in new valves, had the same trouble; put on new carburetor, same result; new coil box, same; put in six dry batteries, missed just as bad. When I start, I have to open the needle valve three-quarters turn; if I don't, it will hit a few licks and stop. I can adjust the carburetor to idle and when I go to pull a hill I will have a fire knock and I can open needle a quarter turn and it will go all right, but when I get over the hill it will load up until I turn it back. What do you think the trouble is?—L. Shepard, Clark & Shepard Garage, Hopkinsville, Ky.

You started in the right direction after Old Man Trouble, but you turned off at the fork in the road. You have not said you went over the timer and possibly the wires and their connections, whereas it appears this is where the fault lies. If the contact of the timer parts were not sufficient, or if they were fouled, then the faint spark may be the trouble.

First look at the valve tappet adjustment and make sure there is a card-board clearance, so the valves will seat properly. Then tackle the wires—all of them—and see that good connections are made, that none are broken within the insulation, that the terminals and wires are clean; then go to the timer and go over every piece and part. You can speed up the engine to average running speed and see if there is misfiring in one or more cylinders. At the same time run the engine long enough so it will be warmed up thoroughly and then try the clearance between the valve stem and the tappets.

Regulating Charging Current

Q—The lights are fairly good on this Chevrolet 490 while the car is not running. When the engine is running fast the lights are very bright, almost burn out. Then when the engine slows down the lights almost go out. While running fast, the generator charges about 20 amp. or more. What is wrong?—S. F. Reitz, Widnoon, Pa.

The generator used on the Chevrolet 490 employs a third brush in the regulation of the charging current, and it is the position of this third brush that is causing the trouble. You will note from the diagram in Fig. 10, that the closer the third brush is to the immediately adjacent brush, the higher will be the voltage produced, for this is dependent on the voltage impressed across the shunt field.

If the third brush is as close to the large brush as it is possible to bring it, then the voltage produced will be very near 10, as the illustration shows. In your case the voltage across the shunt field is about 9, and this causes the excessively large charge rate. Move the brush in a direction counter to the direction of rotation, and this decreases the rate. For your case it seems a movement of about 1/4 in., will bring the rate to the right amount.

The Motor Car Repair Shop

Practical Maintenance Hints

Cheap Tin Shears

A GOOD pair of 10-in. tinners' snips cost to-day \$2.50, and for most purposes that pair of bench tin shears made from two old files, as indicated in the accompanying sketch, will answer just as well, and they cost nothing more than a little spare time in their making.

The moving blade A is made from one old 14-in. file. Heat the file and punch a $\frac{3}{8}$ -in. hole through it about 3 or 4 in. from the end. With a drift then grind one side of the file smooth and grind the end curved. Also grind the cutting edge slightly bevel.

The stationary jaw is made by forging the other file L-shaped and grinding the inside smooth and beveling a cutting edge on under side of blade. The vertical leg of these shears is held in a slot cut in the bench plank or it can be gripped in the bench vise.

Care of Cords

It is generally known among motorists that cord tires are built to withstand a great deal of wear and tear and even to take a large measure of undeserved punishment and, despite severe use, to deliver satisfactory service and mileage. But just as a big robust man takes his good health as a matter of course and grows overconfident and careless, cord tire users often abuse and neglect their tires because they have been getting such good results with so little attention to them.

But everything has its limit of endurance, cord tires along with other things. While a motorist may misuse his tires and yet obtain a fairly satisfactory service from them, he obviously is not getting their full quota of inbuilt mileage. And in these days when, in the interest of economy and conservation, every tire should be made to run out its last possible mile, the motorist who is wasting a portion of the life of his tires is not doing his full duty.

According to G. E. Brunner, manager of the Goodyear Tire & Rubber Co.

service department, fully 40 per cent of the new cord tires that have been sold by that company's service stations in the last few months, to replace worn-out cords, have replaced tires that went out of commission prematurely because of improper care and neglect. And almost invariably the untimely demise of the tire could be traced to the lack of proper air pressure. Mr. Brunner states:

Because of the larger air capacity in our cord tires and their greater flexibility and more durable construction, we have advocated inflation pressures for cord tires 10 per cent more than for fabric tires, says Mr. Brunner. But motorists, encouraged by the good service received, have been revising our inflation schedules downward and becoming careless about proper inflation. A recent investigation, which we made, showed that many cord tires users were carrying only about half the recommended air pressure. And yet the great majority of these motorists were obtaining what to them was very satisfactory service.

Our cord tires have a 10 per cent larger air capacity than the same size in fabric tires, so the factor of safety in air pressure for cord tires we place at 10 per cent.

Proper Air Pressure

The use of cord tires is increasing rapidly and will continue to do so, because of their easy-riding qualities and the increased mileage they deliver. But sufficient attention must be paid to the maintenance of proper air pressures if they are to be permitted to run out their full life. The layers of rubber between the piles of cords are heavy—so heavy that the tires will hold up under a tremendous amount of punishment—but they have a limit, and whenever that limit is reached the motorist pays for his experience with mileage that is lopped off his tires.

PROGRAM FOR SHEEPSHEAD BAY

Sheepshead Bay, L. I., Sept. 12—An open race of 105 miles has been arranged for the Sheepshead Bay track for Sept. 20, open to cars of 300 cu. in. and less piston displacement. A purse of \$7500 is offered.

A second race, of three 10-mile heats will be a special match event.

Simple Bench Clamp

A piece of 2 by 4 lumber, a short length of $\frac{1}{2}$ by 1-inch bar iron, an old brace will do, and a common long-threaded bolt is all the material required to make the handy bench clamp shown.

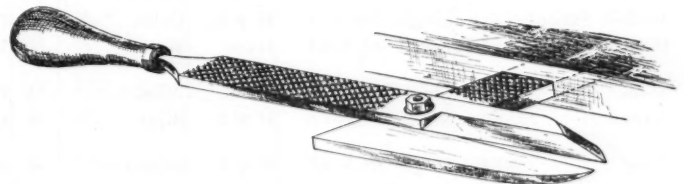
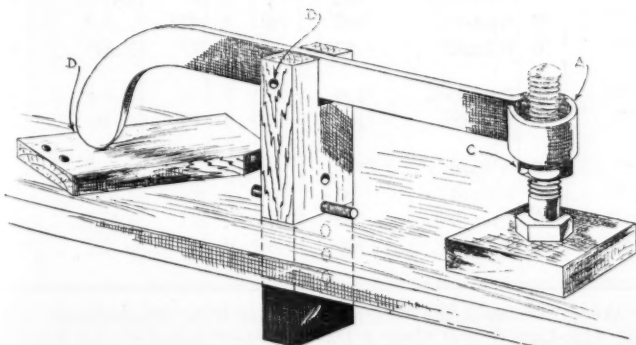
To make this tool one has but to give a little attention to its construction as shown in the sketch. The piece of 2 by 4 is used to make the vertical leg. A slot is sawed in the top end to take the clamp arm. Holes are bored in the leg at intervals to take the height-adjusting pin. The arm is easy to make. The piece of iron is heated and bent curved at the one end and bent around in a small circle at the other, as shown at A. A hole for the pin B is drilled in it. This completes all the work there is to making the clamp.

The bolt is used in the end of the arm as follows: The nut is run on the bolt and the end of the bolt slipped in the hole formed by bending the arm end around, and as can be seen, by tightening up the nut the end of the arm is forced up, thus making the foot D clamp down the work on the bench. The leg binds itself in the slot in the bench. I have one of these clamps on my bench and find it very valuable aid in my shop work.—Charles H. Willey, Concord, N. H.

Brass Wire

A few years ago brass wire, flat on one side and oval on the other, was used to wrap ignition cable instead of running the cable through a flexible tube. Some of this wire is still to be found on the market and almost any repairshop probably has a little, that has been removed from a car, still on hand.

This brass wire has great tensile strength and is ideal for many purposes, such as wrapping hose, wrapping fuel lines and soldering and even for fuze wire. If a repairman happens to come across any of this kind of cable, he will find it to his advantage to lay it aside for future use, and this use will come many times in a year.



Above—Pair of bench tin shears made from old files

Left—Simple bench clamp which is easy to make

Specifications of the Electrical Equipment That Is Found on 1919 Passenger Cars

Make and Model	IGNITION			GENERATOR		MOTOR		BATTERY			Wiring-System	Type of Electric System	FUSES		
	System	Make	Control	Make	Volt age	Make	Volt age	Make	Amp. Hr.	Volt age			Type	Volts	Amp
Allen.....43	Single	Conn.	Hand.	A-L.	6	A-L.	6	Prest-O-L.	90	6	1	GI.	GT.	5	15
American.....B	Single	At-Kent.	Hand.	West.	6	West.	6	Columbia.	80	6	1	S.	3-A.	1.250	20
Anderson.....All	Single	Conn.	Hand.	West.	6	West.	6	Willard.	90	6	1	S.	SAE.	6	5
Apperson.....All	Single	Remy.	Hand.	Bijur.	6	Bijur.	6-8	Willard.	108	6	1	S.	Open.	1.250	10
Auburn.....6-39	Single	Remy.	Hand.	Remy.	6	Remy.	6	Willard.	80	6	1	S.		6-8	25
Austin.....12	Single	Delco.		Delco.	6	Delco.	6	Willard.		6	1	S.	None.		
Biddle.....H	Single	Eisemann.	Hand.	G & D.	6	G & D.	6	Willard.	90	6	1	S.	GT.	6	10
Bour-Davis.....20	Single	Remy.	Hand.	Remy.	6	Remy.	6	Willard.	103	6	1	S.	GT.	6	15
Brewster.....	Single	U. S. L.	Hand.	U. S. L.	12	U. S. L.	12				1				
Briscoe.....4-24	Single	Conn.	Hand.	A-L.	6	A-L.	6	U. S. L.	80	6	1	GI.	GT.	6	15
Buick.....	Single	Delco.	Hand.	Delco.	6	Delco.	6	U. S. L.	80	6	1	S.			
Cadillac.....57	Single	Delco.	Hand.	Delco.	6	Delco.	6	Exide.		6					
Case.....U-19	Single	West.	Hand.	West.	6	West.	6	Willard.	117½	6	1	GI.	3AGT.	50	15
Chalmers.....35C	Single	Remy.	Hand.	West or A-L.	6	West or A-L.	6	Prest-O-L.	106		1	GI.		6	15
Champion.....KO	Single	Delco.	Hand.	Dyneto.	6	Dyneto.	6	Willard.	90	6	1	S.	GT.	6	15
Chandler.....All	Single	Bosch.	Hand.	West.	6	West.	6	Prest-O-L.	105	6	1	S.	Cart.	6	20
Chevrolet.....All	Single	Remy.	Hand.	A-L.	6	A-L.	6	Willard.	80	6	1	GI.	GT.	6	20
Cleveland.....4	Single	G & D.	Hand.	G & D.	6	G & D.	6	Prest-O-L.	94	6	1			6	50
Cole.....870	Dual	Delco.	H & A.	Delco.	6	Delco.	6	Prest-O-L.	50	6	1	S.			
Columbia.....All	Single	At-Kent.	Hand.	A-L.	6	A-L.	6	Prest-O-L.	80	6	1	S.			
Comet.....C-53	Single	Wagner.	Hand.	Wagner.	6	Wagner.	6	Willard.	75	6	1				
Crow-Elkhart.....K-36	Single	Conn.	Hand.	Dyneto.	6	Dyneto.	6	Willard.		6				6	10
Cunningham.....V-3	Single	Delco.	Hand.	West.	6	West.	6	Willard.	120		1				
Daniels.....8-B	Single	West.	Hand.	West.	6	West.	6	Willard.	100		1	S.	GT.	5-8	15
Davis.....51	Single	Bosch.	Hand.	Delco.	6	Delco.	6	Willard.	80	6	1	S.			
Dixie Flyer.....	Single	Conn.	Hand.	Dyneto.	6	Dyneto.	6	Willard.	6-80		2				
Dodge.....	Single		H & A.	N. E.	12	North East.		Willard.	42	12	1	GM.	Encl.	1-50	10
Dorris.....	Single		Hand.	West.	6	West.		Willard.	115	6	1	S.	GT.	5-8	15
Dort.....15	Single	Conn.	Hand.	West.	6	West.	6	Willard.	85	6	1	S.		6	10
Elcar.....All	Single	At-Kent.	Hand.	Dyneto.	7	Dyneto.	6	Willard.	90	6	1				
Elgin.....H	Single	Wagner.	Hand.	Wagner.	6	Wagner.	6	Willard.	90	6	1		GT.	6-8	20
Essex.....A	Single	Delco.	H & A.	Delco.	7	Delco.	6	Exide.	105	6	1	S.			
Ford.....T*	Single	Own.	Hand.	Own.		Own.		Exide.	80	6	1	S.			
Franklin.....9-B	Single	At-Kent.	Auto.	Dyneto.	12			Willard.	50	12	2	GM.	GT.	126	15
Geronimo.....		Delco.		Dyneto.	6	Dyneto.	6	Willard.	88	6	1	S.			
Glide.....6-40		West.		West.	6	West.	6	Willard.	80	6	1	GI.	Cart.	250	15
Hanson.....45-A		Remy.	Hand.	A-L.	6	A-L.	6	Prest-O-L.	80	6	1			6	3
Harroun.....	Single	At-Kent.	Hand.	Remy.	6	Remy.	6	Willard.	80	6	1				
Harvard.....4-20		At-Kent.		Wagner.	6	Wagner.	6	Nat. Carb.			1	S.			
Hatfield.....A		Conn.		Dyneto.	6	Dyneto.	6	Willard.	100	6	1	GI.			
Haynes.....All	Single	Remy	Auto.	Leece-N.	6	Leece-N.	6	Willard.	120	6	2	GI.	C. B.		
		Delco													
Hollier.....All	Single	At-Kent.	Hand.	Splitdorf.	6	Splitdorf.	12	Gould.	50	6	1	GM.			
Holmes.....	Single	Eisemann.	Auto.	Dyneto.	12			Columbia.	100	12	2	S.	2A.	15	15
Hudson Super-Six.....	Single	Delco.	H & A.	Delco.	7	Delco.	7	Exide.	100	6	1	GM.			
Hupmobile.....R	Single	At-Kent.	Hand.	West.	6	West.	6	Willard.	87½	6	1	S.	Encl.	6	10
Jones.....	Single	Remy.	Hand.	West.	6	West.	6	Prest-O-L.	120	6	1				
Jordan.....	Single	Delco.	H & A.	Bijur.	6	Bijur.	6	Willard.	109.8	6	1	S.	C. B.		
King.....EE-8	Single	At-Kent.	H & A.	Bijur.	6	Bijur.	6	Willard.	117.5	6	1				
Kissel.....	Single	Remy.	Hand.	Remy.	6	Remy.	6	Willard.	90	6	1	S.	3 A. G.		20
Kline.....642-SS	Single	Conn.	Hand.	West.	6	West.	6	Prest-O-L.	80	6	1	S.	5 A. G.	6	
Lexington.....R-19	Single	Conn.	Hand.	West.	6	West.	6	Willard.	100	6	1	S.	G. T.	6	

ABBREVIATIONS: *Starting and Lighting in closed models only. Ignition: At-K, Atwater-Kent; Conn., Connecticut; West, Westinghouse; Auto, Automatic; H & A, Hand and Automatic; S. A., Semi-Automatic. Generator: A-L, Auto-Lite; G & D, Gray & Davis; Leece-N, Leece-Neville; Ward-L, Ward-Leonard; West, Westinghouse; N. E., North East; Split, Splitdorf. Motor: A-L, Auto-Lite, G & D, Gray & Davis; Leece-N, Leece Neville; West, Westinghouse.

Giving Ignition, Starting, Lighting, Battery, Lamp, Spark Plug and Horn Data

Base Contact	LAMP CANDLEPOWER, VOLTAGE AND TYPE OF BASE								SPARK PLUGS			Horn	Make and Model
	HEADLIGHTS		SIDELIGHTS		TAILLIGHTS		DASHLIGHT		Make	Diam. Inches	Thread Pitch		
	Volts	CP.	Volts	CP.	Volts	CP.	Volts	CP.					
Single....	6-8	15	*6-8	4	6-8	2	6-8	2	Champion.	7/8	18	Klaxon....	Allen.....43
Single....	6-8	15	*6-8	5	3-4	2	3-4	2	Champion.	7/8	18	Sparton...	American.....B
Single....	6-8	21	6-8	4	6-8	4	6-8	4	A. C.....	7/8	18	Klaxon....	Anderson.....All
Double....	6-8	15	*6-8	4	d6-8	2	d6-8	2	A. C.....	7/8	18	Sparton...	Apperson.....All
Single....	6-8	15	*6-8	4	6-8	2	6-8	2	Rajah.....	7/8	18	E. A.....	Auburn.....6-39
Single....	6-8	21	6-8	4	6-8	4	6-8	2	Reflex....	7/8	18	Sparton...	Austin.....12
Single....	6-8	21	*6-8	4	6-8	2	d6-8	2	Splitdorf...	7/8	18	Klaxon....	Biddle.....H
Single....	6-8	15	6-8	5	6-8	2	6-8	2	A. C.....	7/8	18	E. A.....	Bour-Davis.....20
Single....	12	36	12	4	6-8	2	d6-8	2	Herz-Boug.	7/8	18	Klaxon....	Brewster.....
Single....	6-8	21			6-8	2	d6-8	2	Champion.	7/8		Schwarze.	Briscoe.....4-24
Single....	6-8	15	6-8	4	6-8	2	6-8	2	A. C.....	7/8	18	Stewart...	Buick.....
Single....	6-8	21	6-8	4	3-4	2	3-4	2	Titan.....			Auto-horn.	Cadillac.....57
Single....	6-8	21	6-8	4	6-8	2	6-8	2	A. C.....	7/8		Klaxon....	Case.....U-19
Single....	6-8	21	6-8	4	6-8	2	6-8	2	A. C.....	7/8	18	Schwarze.	Chalmers.....35-C
Single....	6-8	15			6-8	2	6-8	2	Champion.	7/8	18	Garford...	Champion.....KO
Single....	6-8	18	6-8	4	6-8	2	6-8	2	A. C.....	7/8	18	Trojan....	Chandler.....All
Single....	6-8	21	6-8	4	6-8	2	d6-8	4	A. C.....	7/8	18	Klaxon....	Chevrolet.....All
Single....	6-8				6-8		6-8		A. C.....	7/8	18	Trojan....	Cleveland.....40
Single....	6-8	21	*6-8	5	6-8	2	d6-8	5	A. C.....	7/8	18	Sparton...	Cole.....870
Single....	6-8	15	*6-8	4	6-8	2	d6-8	2	Champion.	7/8	18	Schwarze.	Columbia.....All
Single....	6-8	18			6-8	2	6-8	4	Champion.	7/8	18	Klaxon....	Comet.....C-53
Single....	6-8	15	6-8	4	6-8	2	6-8	2	Champion.	7/8		E. A. Lab.	Crow-Elkhart.....K-36
Single....	6-8	21	6-8	4	6-8	2	6-8	2	Champion.			Sparton...	Cunningham.....V-3
Single....	6-8	21	6-8	4	6-8	2	d6-8	2	A. C.....	5/8	18	Klaxon....	Daniels.....8-B
Single....	6-8	21			6-8	2	6-8	2	A. C.....	7/8	18	Klaxon....	Davis.....51
Double....	6-8	15			d3-4	2	d3-4	2	Champion.			Garford...	Dixie Flyer.....
Single....	12-18	15			12-18	2	12-18	2	A. C.....	7/8	18	Klaxon....	Dodge.....
Single....	6-8	21	*6-8	4	6-8	2	6-8	2	Champion.	7/8	18	Klaxon....	Dorris.....
Single....	6-8	15			6-8	2	d6-8	2	A. C.....	7/8	18	Schwarze.	Dort.....15
Single....	6-8	15	6-8	4	6-8	2	6-8	2	Champion.			Klaxon....	Elcar.....All
Single....	6-8	21			6-8	2	6-8	2	Champion.	7/8	18	E. A. L...	Elgin.....H
Single....	6-8	15			3-4	2	*3-4	2	A. C.....	18 m.m.	1.5 m.m.	Sparton...	Essex.....A
Single....	6-8	21	6-8	2	6-8	2			Champion.	1/2	pipe	Own.....	Ford.....T
Double....	12-16	21	*12-16	4	6-8	2	6-8	2	Splitdorf...	7/8	18	Klaxon....	Franklin.....9-B
Single....	6-8	21			6-8	2	6-8	2	Benton....				
Single....	6-8	15	*6-8	4	d6-8	2	d6-8	2	Champion.	7/8	18	Trojan....	Geronimo.....
Single....	6-8	15							Champion.	7/8	18	Klaxon....	Glide.....6-40
Single....	6-8	15			6-8	2	6-8	2	Champion.	7/8	18	Schwarze.	Hanson.....45-A
Single....	6-8	15			3-4	2	d3-4	2	A. C.....			Schwarze.	Harroun.....
Single....	6-8		3-4		3-4		*3-4			7/8	18		Harvard.....4-20
Single....	6-8	15	*4-8	4	6-8	4	6-8	2	A. C.....	7/8	18	Ecco.....	Hatfield.....A
Double....	6-8	15	*6-8	12	d6-8	2	6-8	2	A. C.....	7/8	18	Klaxon....	Haynes.....All
Single....	6-8	15			6-8	2	6-8	2	Champion.	7/8	18	Sparton...	Hollier.....All
Double....	12-18	30	*12-16	4	6-8	2	6-8	2	Bethlehem	7/8	18	Klaxon....	Holmes.....
Single....	6-8	15	6-8	4	3-4	2	*3-4	2	A. C.....	7/8	18	Sparton...	Hudson Super Six.....
Single....	6-8	15	6-8	2	6-8	2	6-8	2	A. C.....	7/8	18	Trojan....	Hupmobile.....R
Double....	6-8	15	*6-8	4	s6-8	2	s6-8	2	Champion.	7/8	18	Newtone...	Jones.....
Single....	6-8	18	*6-8	4	6-8	2	6-8	2	A. C.....	7/8	18	Sparton...	Jordan.....
Single....	6-8	21	*6-8	4	6-8	2	6-8	2	Champion.	7/8	18	E. A. L...	King.....EE-8
Double....	6-8	18			d6-8	2	d6-8	2	A. C.....	7/8	18	Sparton...	Kissel.....
Single....	6-8	15			6-8	2	d6-8	2	Champion.	7/8	18	Klaxon....	Kline.....642 S. 8
Single....	6-8	21	*6-8	4	6-8	2	d6-8	2	Champion.	7/8	18	Klaxon....	Lexington.....R-19
									Bethlehem				

Battery: *Prest-O-L*, *Prest-O-Lite*. Wiring system: *GI*, Generator and Ignition combined; *GIM*, Generator, Ignition, Motor combined; *S*, Generator, Motor, Ignition separate; *GM*, Generator and Motor combined. Fuses: *GT*, Glass Tube; *Cart*, Cartridge; *C. B.* Circuit Breaker. Lamps: *Dashlights in series with taillights; headlight contains sidelight; d,—double contact; s,—single contact.

Specifications of the Electrical Equipment That Is Found on 1919 Passenger Cars

Make and Model	IGNITION			GENERATOR		MOTOR		BATTERY		VOLT age	Wiring Sys- tem	Type of Elec- tric Sys- tem	FUSES		
	Sys- tem	Make	Control	Make	Volt age	Make	Volt age	Make	Amp. Hr.				Type	Volts	Amp
Liberty.....10B	Dual	Delco.....	Hand.....	Delco.....	6	Delco.....	6	Willard.....	88	6	1	GI.....			
Locomobile....48-4-5	Dual	Berling.....	Hand.....	West.....	6	West.....	6	Exide.....	150	6	1	S.....	G. T.....	6	10
Maibohm.....B	Single	At-Kent.....	Hand.....	Wagner.....	6	Wagner.....	6	Willard.....	94	6	1	S.....	A 1.....	6	30
Marmon.....34	Single	Bosch.....	Hand.....	Bijur.....	6	Bijur.....	6	Prest-O-L.....	120	6	1	S.....	Cart.....		20
Maxwell.....25	Single		Hand.....	Simms-Huff..	12	Simms-Huff..	12	Prest-O-L.....	35	12	1	GM.....	Cart.....	12	20
McFarlan.....127	Double	West.....	Hand.....	West.....	6	West.....	6	Willard.....	5 Amp. 27.8 h. p.	6	1	GI.....	5 A. G.....	6	
Mercer.....Ser. 4	Single	Berling.....	Hand.....	West.....	6	West.....	6	Willard.....	90	6	1	S.....	Cart.....		10
Metz.....	Single	Conn.....	Hand.....	West.....	6	West.....	6	Willard.....	120	6	1				
Mitchell.....E-40	Single	Remy.....	Hand.....	Remy.....	6	Remy.....	6	Willard.....	100	6	2	GM.....	Cart.....	6	20
Moline Knight..L	Dual	Conn.....	Hand.....	Wagner.....	6	Auto-Lite....	6	Willard.....	117	6	1	S.....	Cart.....	250	20
Monitor.....	Single	Conn.....	Hand.....	Dyneto.....	6	Dyneto.....		Prest-O-L.....	110	6	1				
Moon.....All	Single	Delco.....	Auto.....	Wagner.....	6	Wagner.....	6	Exide.....	80	6	1				
Moore.....30	Single	Conn.....	Hand.....	A-L.....	6	A-L.....	6	Willard.....	80	6	2				
Nash.....	Single	Delco.....	H & A.....	Delco.....	6	Delco.....	6	Willard.....	100	6	1	S.....			
National.....6	Single	Delco.....	H & A.....	West.....	6	West.....	6	Prest-O-L.....	110	6	1	S.....	G.....		5
National.....12	Single	Delco.....	H & A.....	Bijur.....	6	Bijur.....	6	Prest-O-L.....	110	6	1	S.....	G.....		10
Nelson.....		Bosch.....	Hand.....	U. S. L.....	12	U. S. L.....	12	Willard.....	72	12	2	S.....	G.....	12	
Oakland.....34-B	Single		Hand.....	Remy.....	6	Remy.....	6	Prest-O-L.....	85	6	1	GI.....			
Oldsmobile.....45-E	Single	Delco.....	Hand.....	Delco.....	6	Delco.....	6	Exide.....	80	6	1				
Olympian.....45	Single	Conn.....	Hand.....	A-L.....	6	A-L.....	6	U. S. L.....		6					
Overland.....90	Single	Conn.....	Hand.....	A-L.....	6-8	A-L.....	6	U. S. L.....	75	6-8		GI.....	Glass.....	6	20
Packard.....3-25	Single	Delco.....	H & A.....	Bijur.....	6	Bijur.....	6	Willard.....	120	6	1	S.....	G. T.....	6	10
Paige.....All	Single	At-Kent.....	Hand.....	Gray & Davis	6	Gray & Davis	6	Willard.....	108.4	6	1	S.....	G.....		20
Pan-American...6-48	Single	At-Kent.....	Hand.....	West.....	6	West.....	6	Willard.....	100	6	1	S.....	G.....	6	
Paterson.....6-46	Dual	Delco.....	Hand.....	Delco.....	6	Delco.....	6	Willard.....	110	6	1				
Pearless.....Ser. 4	Single	At-Kent.....	H & A.....	A-L.....	6	A-L.....	6	Willard.....		6	1				30
Pierce-Arrow..311&511	Double	Delco.....	H & A.....	West.....	6-8	West.....	6	Willard.....	150	6	1	S.....	5 A. G.....	6-8	10
Pilot.....6-45	Dual	Delco.....	Hand.....	Delco.....	6	Delco.....	6	Prest-O-L.....		6	1	GI.....			
Premier.....6-C	Single	Delco.....	Hand.....	Delco.....	6	Delco.....	6	Willard.....	123.5	6	1	S.....			
Reo.....T & U	Single	Remy.....	Hand.....	Remy.....	6	Remy.....	6	Willard.....	108.5	6	2	GI.....	Wire.....	6	5
Revere.....	Single	Bosch.....	Hand.....	North East..	6	North East..	6	Willard.....	120	6	1	S.....			
Roamer.....6-54	Single	Bosch.....	Hand.....	Bijur.....	6	Bijur.....	6	Columbia.....	115	6	1	S.....	3A.....	6	10
Saxon.....Y-18	Single	Remy.....	Hand.....	Wagner.....	6	Wagner.....	6	Prest-O-L.....	60	6	1	S.....	Cart.....	6-8	15
Sayers.....	Single	Delco.....		Delco.....	6	Delco.....	6	Willard.....		6	1				
Scripps-Booth..	Single	Remy.....	Hand.....	Remy.....		Remy.....	6	Prest-O-L.....	80	6	1				
Seneca.....H	Single		Hand.....	Allis Chalm..	6			Willard.....	88	6	1	GM.....			20
Singer.....19	Single	Bosch.....	Hand.....	West.....	6	West.....	6	Willard.....	115	6	1	S.....	G. C.....		5&10
Standard.....8-H	Single	Dixie.....	Hand.....	West.....	6	West.....	6	Willard.....	162	6	1		2-A.....		15
Stanley.....735				Remy.....	6			Willard.....	100	6	1	G.....	Cart.....	6	20
Stearns.....SKL-4	Single	Remy.....	Hand.....	Remy.....	12	Remy.....	12	Willard.....	61.5	12	1	S.....			20
Stephens.....80	Single	Conn.....	Hand.....	A. L.....	6	A. L.....	6	U. S. L.....	116	6	1	S.....	Cart.....	6	20
Studebaker.....All	Single	Remy.....	Hand.....	Wagner.....	6-8	Wagner.....	6	Willard.....	115	6	1	S.....	Cart.....	6	10
Stutz.....G	Double		Hand.....	Remy.....	6	Remy.....		Willard.....		12	2				
Templar.....445	Single	Simms.....	Hand.....	Bijur.....	6	Bijur.....	6	Columbia.....	100	6	1	S.....		6	20
Tulsa.....A-D-1	Single	Delco.....	Hand.....	Dyneto.....	6	Dyneto.....	6	Willard.....	90	6	1	S.....	G. T.....	6	15
Velie.....38	Single	Remy.....	Auto.....	Remy.....	6	Remy.....	6	Willard.....	105	6	1	S.....	Wire.....	6	5
Velie.....48	Single	At-Kent.....	S. A.....	Bijur.....	6	Bijur.....	6	Willard.....	120	6	1	S.....	Wire.....	6	15
Westcott.....A-38&A-48	Single	Delco.....	H & A.....	Delco.....	6	Delco.....	6	Willard.....	117.7	6	1	S.....	C. B.....		
Willys-Knight..88-4	Single	Conn.....	Hand.....	A-L.....	6-8	A-L.....	6	U. S. L.....	120	6	2	GI.....	G. T.....	6	15
Winton Six.....24	Single	Bosch.....	Hand.....	Bijur.....	6	Bijur.....	6	Willard.....	120	6		S.....	3A.....	6	15
Winton Six.....25	Single	Bosch.....	Hand.....	Bijur.....	6	Bijur.....	6	Willard.....	130	6	1	S.....	3A.....	6	15

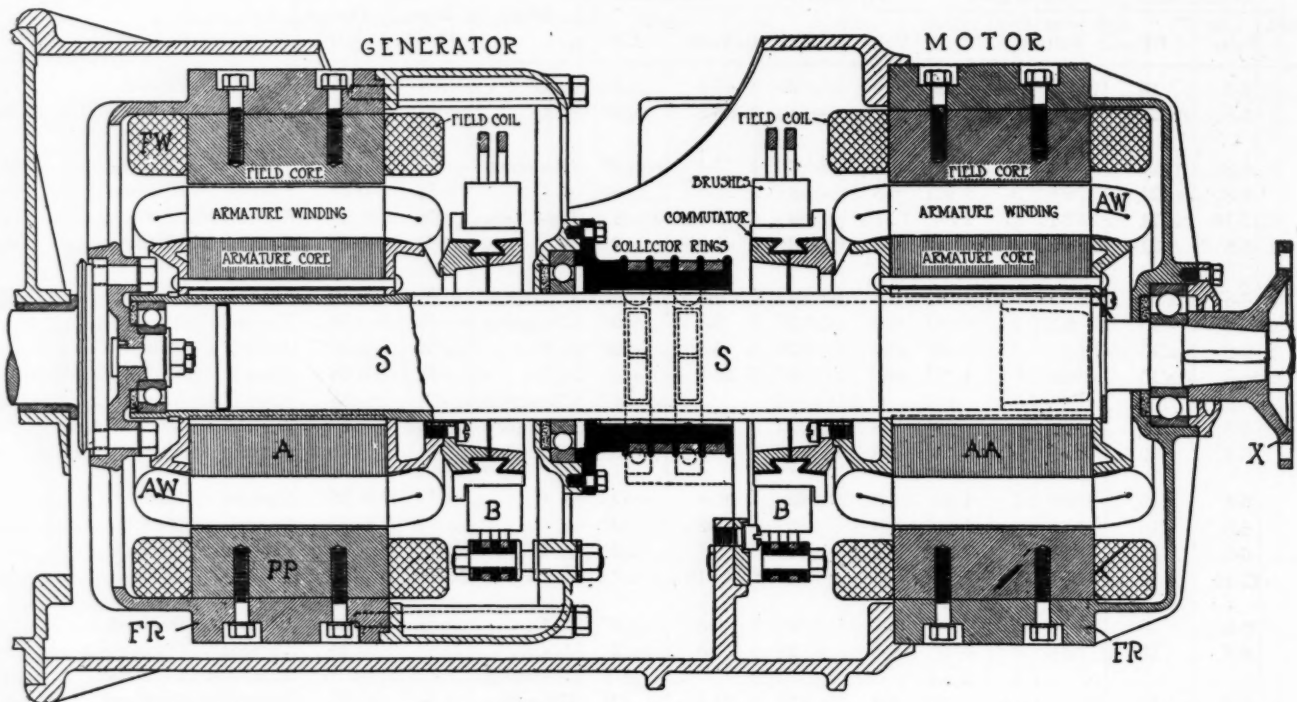
ABBREVIATIONS: *Starting and Lighting in closed models only. Ignition: At-K, Atwater-Kent; Conn., Connecticut; West, Westinghouse; Auto, Automatic; H & A, Hand and Automatic; S. A., Semi-Automatic. Generator: A-L, Auto-Lite; G & D, Gray & Davis; Leece-N, Leece-Neville; Ward-L, Ward-Leonard; West, Westinghouse; N. E., North East; Split, Splitdorf. Motor: A-L, Auto-Lite, G & D, Gray & Davis; Leece-N, Leece-Neville; West, Westinghouse.

Giving Ignition, Starting, Lighting, Battery, Lamp, Spark Plug and Horn Data

Base Contact	LAMP CANDLEPOWER, VOLTAGE AND TYPE OF BASE								SPARK PLUGS			Horn	Make and Model
	HEADLIGHTS		SIDELIGHTS		TAILLIGHTS		DASHLIGHT		Make	Diam. Inches	Thread Pitch		
	Volts	CP.	Volts	CP.	Volts	CP.	Volts	CP.					
Single....	6-8	15	*6-8	4	6-8	2	d6-8	2	A. C.....	7/8	18	United....	Liberty.....10B
Double...	6-8	21	6-8	4	6-8	4	d6-8	2	A. C.....	7/8	18	Klaxon....	Locomobile.....48-4-5
Single....	6-8	21	6-8	4	3-4	2	*3-4	2	Champion.	7/8	18	Schwarze..	Maibohm.....B
Single....	6-8	21	*6-8	9	6-8	4	6-8	4	A. C.....	7/8	18	Sparton...	Marmon.....34
Double...	12-16	21	*12-16	2	12-16	2	12-16	2	Champion.	7/8	18	Schwarze..	Maxwell.....25
Single....	6-8	21	*6-8	12	6-8	2	d6-8	2	A. C.....	7/8	18	Klaxon....	McFarlan.....27
Single....	6-8	21	*6-8	4	6-8	4	6-8	4	Champion.	7/8	18	Sparton...	Mercer.....Ser. 4
Single....	6-8	16	6-8	4	6-8	2	6-8	2	Champion.	7/8	18	Trojan....	Metz.....
Double...	6-8	15			s6-8	2	6-8	2	A. C.....	7/8	18	A. E. L....	Mitchell.....E-40
Single....	*6-8	15	d*6-8	4	d6-8	2	d6-8	4	A. C.....	7/8	18	Klaxon....	Moline Knight.....L
									Champion.	7/8	18	Klaxon....	Monitor.....
Single....	6-8	21			6-8	2	d6-8	2	Champion.	7/8	18	Trojan....	Moon.....All
Single....	6-8	20	6-8		6-8	2			Champion.	7/8	18	Garford...	Moore.....30
Single....	6-8	15	*6-8	4	6-8	2	d6-8	2	A. C.....	7/8	18	Stewart...	Nash.....
	6-8	15	*6-8	4	6-8	2	6-8	2	A. C.....	7/8	18	Sparton...	National.....6
	6-8	15	*6-8	4	6-8	2	6-8	2	A. C.....	7/8	18	Sparton...	National.....12
Double...	12-16	15	12-16	4	12-16	2	12-16	2				Nelson.....	
Single....	6-8	15			6-8	2	6-8	2	A. C.....	7/8	18	Klaxon....	Oakland.....34-B
Single....	6-8	15	*6-8	4	6-8	2	6-8	2	A. C.....	7/8	18	Optional...	Oldsmobile....45-B
									Champion.			E. A. Lab..	Olympian.....45
Single....	6-8	12			3-4	2	*3-4	2	Champion.	1/2		Auto-Lite..	Overland.....90
Single....	6-8	33	*6-8	4	6-8	2	6-8	2	A. C.....	7/8	18	Sparton...	Packard.....3-25
Single....	6-8	15	6-8	4	6-8	2	d6-8	2	A. C.....			Torjan....	Paige.....All
Single....	6-8	32			6-8	2	6-8	4	Champion.	7/8	18	E. A. Lab..	Pan-American....6-48
Single....	6-8	15	6-8	2	3-4	2	*3-4	2	A. C.....			E. A. Lab..	Paterson.....6-46
Single....	6-8	15	6-8	4	6-8	2	6-8	2	A. C.....			Sparton...	Peerless.....Ser. 4
Single....	6-8	21			6-8	5	6-8	5	A. C.....	7/8	18	Klaxon....	Pierce-Arrow...311&511
Single....	6-8	15			6-8	2	6-8	2	A. C.....	7/8	18	Schwarze..	Pilot.....6-45
Double...	6-8	21	*6-8	4	6-8	2	d6-8	2	A. C.....	7/8	18	Stewart...	Premier.....6-C
Double...	6-8	15			3-4	2	*3-4	2	A. C.....	7/8	18	Trojan....	Reo.....T & U
												Klaxon....	
Double...	6-8	20	*6-8	8	6-8	4	6-8	4	Rajah....	7/8		Klaxon....	Revere.....
Single....	6-8	15	*6-8	4	6-8	4	d6-8	4	Champion.	7/8	18	Sparton...	Roamer.....6-54
Single....	6-8	15			6-8	2	6-8	2	A. C.....	7/8	18	Schwarze..	Saxon.....Y-18
Single....	6-8	15			6-8	2	d6-8	2	Champion.			Stewart...	Sayers.....
Single....	6-8	15			6-8	2	6-8	2	A. C.....			Trojan....	Scripps-Booth.....
												Klaxon....	
Single....	6-8	15	6-8	2	6-8	2	d6-8	2	A. C.....			Fitzgerald.	Seneca.....H
Single....	6-8	15		4	6-8	2	d6-8	2	A. C.....	7/8	18	Klaxon....	Singer.....19
Double...	6-8	18	*6-8	4	6-8	2	6-8	2	Splitdorf...	7/8	18	Klaxon....	Standard.....8-H
Double...	6-8	21	*6-8	4	6-8	2	6-8	2				Klaxon....	Stanley.....735
Single....	12-16	21	*12-16	4	12-16	2	12-16	2	A. C.....	7/8	18	B. & A. Lab	Stearns.....SKL-4
Single....	6-8	15	6-8	2	6-8	2	6-8	2	Champion.	7/8	18	Trojan....	Stephens.....80
Single....	6-8	21			6-8	2	6-8	2	Champion.	1/2		Sparton...	Studebaker.....All
Double...	6-8	15	*6-8	4	6-8	2	6-8	2	A. C.....			Klaxon....	Stutz.....G
Single....	6-8	21	*6-8	4	6-8	2	6-8	2	Champion.	7/8		Schwarze..	Templar.....445
Single....	6-8	21	6-8	2	6-8	2	d6-8	2	Champion.	7/8	18	Klaxon....	Tulsa.....A-D-1
Single....	6-8	21	*6-8	4	6-8	2	d6-8	2	Champion.	7/8	18	Sparton...	Velie.....38
Single....	6-8	15	6-8	4	6-8	4	d6-8	4	Champion.	7/8	18	Sparton...	Velie.....48
Single....	6-8	18	*6-8	4	3-4	2	d3-4	2	A. C.....	7/8	18	Klaxon....	Westcott...A-38&A-48
4 S-D2....	6-8	21	6-8	4	3-4	2	*3-4	2	Champion.	7/8	18	Klaxon....	Willys-Knight....88-4
												A. L.	
Single....	6-8	17	6-8	7	6-8	2	6-8	2	Champion.	7/8	18	American..	Winton Six.....24
Single....	6-8	17	6-8	7	6-8	2	6-8	2	Champion.	7/8	18	Electric...	Winton Six.....25

Battery: *Prest-O-Lite*, *Prest-O-Lite*. Wiring system: *GI*, Generator and Ignition combined; *GIM*, Generator, Ignition, Motor combined; *S*, Generator, Motor, Ignition separate; *GM*, Generator and Motor combined. Fuses: *GT*, Glass Tube; *Cart*, Cartridge; *C. B.*, Circuit Breaker. Lamps: *Dashlights in series with taillights; headlight contains sidelight; d,—double contact; s,—single contact.

Motor Age Wiring Chart No. 46



Above—Sectional view of generator and motor used on Owen Magnetic. The armatures of the two electrical machines are directly connected to the engine and revolve with it at all times

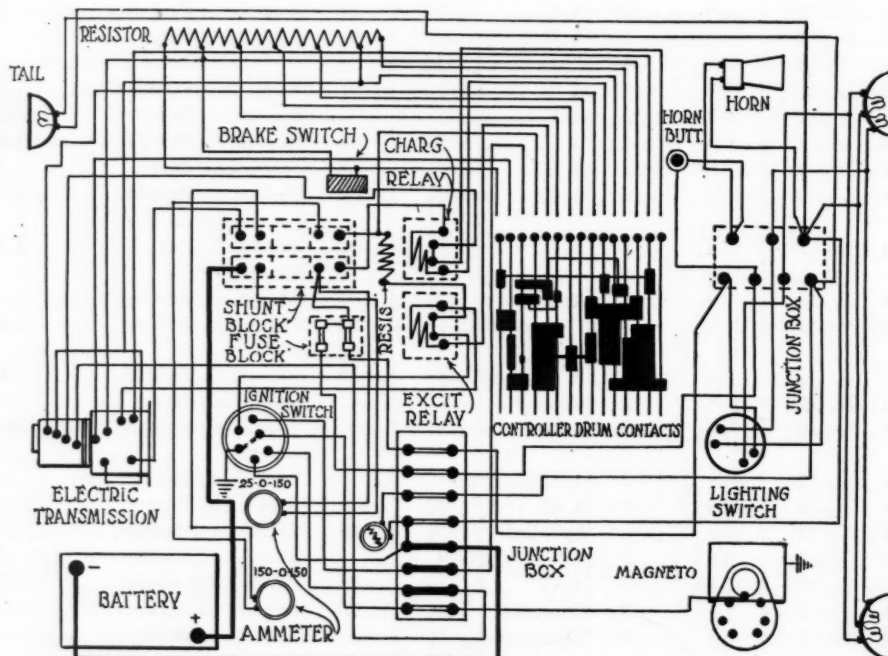


Diagram of connections on Owen Magnetic, showing contacts in controller box

Special Systems for Fords—May 15-22
General Battery Charging—May 29
General Magneto Diagrams—June 5
Internal Connections—July 10-17-24

Abbott—March 20-27
Alco—April 24
Alter—Nov. 4
Apperson—March 6
Buick—Nov. 21-April 3
Cadillac—Dec. 9
Cartecar—May 1
Cole—Jan. 23-April 3
Case—Feb. 27
Chalmers—Feb. 20-Mar. 27
Chandler—April 3
Chevrolet—Nov. 28-Mar. 27
Crow-Elkhart—June 26
Davis—May 8
Detroitter—March 6
Dodge—Dec. 12

Dort—March 13
Elgin—Feb. 27
Empire—March 13
Ford—Jan. 30-Feb. 6-May 15, 22
Franklin—June 19
Grant—Feb. 27-Mar. 27
Haynes—Sept. 4-11
Henderson—April 3
Hudson—Dec. 5-May 1
Hupmobile—Feb. 13
Interstate—March 13
King—July 3
Kissel—July 3
Krit—Feb. 6

Lexington—April 24
Little—March 20
Locomobile—Jan. 23-Apr. 17
Maxwell—Jan. 16-Aug. 14-Sept. 11
Marion—March 6-20
Mercer—Jan. 23-Aug. 28
Michigan—March 20
Mitchell—Jan. 9
Murray—May 1
National—June 19
Oakland—Jan. 2
Oldsmobile—Jan. 23
Packard—June 19-July 31
Overland—Nov. 7-14

Paige—July 3
Paterson—Mar. 20-June 26
Premier—April 10
Pullman—April 10
Regal—Feb. 6-April 10
Reo—Feb. 27-Aug. 21
Saxon—April 17
Scripps-Booth—Dec. 26
Simplex—April 17
Stanley—June 26
Stearns-Knight—April 24
Studebaker—Dec. 26
Stutz—Jan. 23
Vellie—April 24
Westcott—May 8

Valve Timing

Measured in Degrees and Minutes

Motor Age Maintenance Data Sheet No. 54

One of a series of weekly pages of information valuable to service man and dealer—Save this page

1918 Cars, Concluded

	Intake		Exhaust		Valve Clearance		Valve Stems	
	Opens After Upper Dead Center	Closes After Lower Dead Center	Opens Before Bottom Dead Center	Closes After Top Dead Center	Intake	Exhaust	Valve Diameter	Diameter Length
Harroun AA-1	5-50	49-42	46-52	1	.....	.....	1.375	.3105 4 $\frac{1}{8}$
Haynes 38-39	5	35	47	2	.....	.....	1.5625	.4375 6 $\frac{5}{8}$
Haynes 43-44	5	35	47	2	.....	.....	1.375	.375 4 $\frac{5}{8}$
Holmes I	15	33	150	15	.035	.035	{ 1.25 1.785	{ .3125 .375 } 4 $\frac{1}{2}$ 4 $\frac{3}{4}$
Hudson M	7	42	55	8	.004	.006	1.8125	.375 6 $\frac{1}{8}$
Hupmobile R	12	44	44	12	.003	.003	1.625	.375 5 $\frac{1}{4}$
Jones 27	10	28	40	2.5	.002	.003	1.6875	.375 5 $\frac{1}{2}$
Jordan C	10	28	40	2.5	.004	.004	1.6875	.372 5 $\frac{1}{4}$
Kissel Kar	10	33	45	5	.004	.004	1.8125	.375 5 $\frac{1}{8}$
Klinekar	12	45	55	12	.004	.004	1.5625	.3125 5
Lexington 6-R	0	33	67	0	.004	.004	1.375	.310 5 $\frac{1}{8}$
Locomobile 38	0	*5 $\frac{1}{8}$	*3 $\frac{1}{4}$	*1 $\frac{1}{8}$	.....	.....	2.5	.433 7 $\frac{3}{8}$
Locomobile 48	*3 $\frac{1}{2}$	*3 $\frac{1}{4}$	*3 $\frac{1}{4}$	0	.....	.....	2.125	.433 8 $\frac{3}{8}$
Maibohm B	13	42	45	10	.004	.006	1.25	.3125 4 $\frac{3}{8}$
Marmon 34	19	35	45	12	.003	.003	1.9375	.375 5 $\frac{1}{2}$
Maxwell 25	5	40	35	5	.....	.....	.....	.....
McFarlan X	10	40	55	5	.....	.....	.....	.....
Mercer	5	55	70	15	.003	.004	2.125	.370 9
Mitchell C-42 & D-40	10	35	41	4	.004	.004	1.5625	.372 6 $\frac{1}{8}$
Moline-Knight L	18	50	5	50	.....	.....	.....	.....
Monitor M & O	0	33	67	0	.....	.....	.....	.....
Moore	.....	.....	.....	.....	.34375	.34375	1.75	.375 6 $\frac{1}{2}$
National AF	10	28	40	30	.003	.003	1.53125	.372 6 $\frac{1}{8}$
National AK	6	43	42	2-30	.004	.004	1.4375	.356 5 $\frac{1}{8}$
Nelson C	15	35	45	10	.005	.005	1.25	.3125 5 $\frac{1}{4}$
Oakland 34-B	17 $\frac{1}{2}$	38	42-30	50	.3446	.3446	1.125	.3125 5
Oldsmobile 45 A	15	38	45	10	.004	.004	1.125	.3110 4 $\frac{1}{8}$
Oldsmobile 37 A	17 $\frac{1}{2}$	38	42	7-30	{ .008 .010	{ .008 .010	1.125	.310 4 $\frac{1}{8}$
Olympian 45	0	62	65	5	.003	.003	1.75	.3745 5 $\frac{1}{4}$
Overland 90 & 90-B	8	38	46	15	.012	.012	1.5625	1.71875 6 $\frac{1}{8}$
Owen-Magnetic W-42	5	50	45	0	.005	.005	1.8125	.434 5.078
Owen-Magnetic 0-36	5-30	34	60	3-30	.005	.005	1.6875	.372 7 $\frac{1}{8}$
Packard	9	42-30	47-30	4	.0025	.004	1.65625	.3593 6 41-64
Paige 6-55	10	28	40	2-30	.003	.003	1.6875	.3720 6 $\frac{1}{8}$
Paige 6-40	15	50	45	10	.003	.003	1.4375	.3110 5 $\frac{1}{2}$
Paterson 6-46	12	45	55	12	.....	.....	1.5625	.3125 4 $\frac{3}{4}$
Peerless 56	122	70	70	22	.....	.....	1.75	.371 6 $\frac{3}{8}$
Phianna M	0	45	55	20	.004	.004	1.8125	.372 8
Pilot 6-45	12	30	45	7	.006	.006	1.5625	.375 6 $\frac{5}{8}$
Premier 6-C	15	38	45	10	.0135	.0135	1.5	.372 5 $\frac{1}{8}$
Reo T	17-76	36-42	53-30	14-21	.005	.005	{ 2.3125 1.75	{ .4375 .375 } 3 $\frac{1}{2}$ 5 $\frac{1}{4}$
Revere	7	11	50	7	.362	.362	2.25	.4375 5 $\frac{1}{8}$
Roamer C-6-54	10	28	40	2-30	.003	.005	1.6875	.372 6 $\frac{1}{8}$
Roamer D-4-75	7	51	50	11	.004	.004	1.971	{ .405 .4362 } 5 $\frac{3}{4}$ 5 $\frac{3}{4}$
Savers A	12	45	55	12	.003	.004	1.5625	.310 4.656
Scripps-Booth G	16	52	40	16	.....	.....	1.5	.310 4
Seneca	10	24	45	5	.004	.006	1.625	.3125 5 $\frac{1}{8}$
Standard G	8	45	45	8	.003	.003	1.625	.435 6 $\frac{1}{4}$
Stephens 70	5	49	49	12	.....	.....	1.59375	.3125 5 $\frac{1}{8}$
Studebaker SF	12-30	32-30	45	7-30	.....	.....	.....	.....
Studebaker EG-ED	12-30	37-30	45	7-30	.....	.....	.....	.....
Templar	10	36	50	10	.003	.005	1.75	.375 4 $\frac{1}{4}$
Tulsa	5	32-42	47-18	10	.003	.003	1.5	.374 5 $\frac{1}{2}$
Velie 38	0	33	67	0	.025	.025	1.375	.310 5 $\frac{1}{8}$
Velie 39	10	28	40	2-30	.025	.025	1.53125	.372 6 $\frac{1}{8}$
Westcott 18 & 18A	10	28	40	2-30	.3055	.331	1.53125	.372 6 $\frac{1}{8}$
Winton 22	21	45	54	12	8	8	{ 2.4375 2.1875	.4975 8 $\frac{3}{4}$
Winton 22A	21	45	54	12	8	8	{ 1.9375 1.6875	.435 8 $\frac{3}{4}$
Willys-Knight 88-4	8	37	48	5	.....	.....	.....	.....
Willys-Knight 88-8	15	40	50	8	.....	.....	.....	.....
Willys Six 89	10	28	40	2-30	.002	.002	1.546875	1.6875 6 $\frac{1}{8}$

*Inches piston travel. ‡After, †Before.

The Accessory Corner

New Fitments for the Car

Dann Jiggle Cups

THE Jiggle cup is an oil-lubricating device for spring shackles and all places where grease cups are now used. With these oil cups no oil is fed to the bearing when the car is standing still, passage over the road causing the ball valve to be shaken from its seat and thus permitting the passage of oil. The cup has an easily removable cap which can be filled quickly with an oil can. Should the cup become clogged, it can be unscrewed and cleaned. The cup is furnished with a vertical or horizontal outlet. It is made by the Auto-Ware Corp., Detroit.

Steam Carburetor Attachment

The Automatic Steam carburetor is a device that mixes hot air from the exhaust manifold with water vapor from the radiator and injects the mixture into the manifold through the carburetor on the engine. A tube for the mixture is taken from the water in the waterjacket of the engine. The hot air from the exhaust manifold splashes the water into steam, and this is the mixture that it forced into the engine. The device is manufactured by the Automatic Steam Carburetor Co., 2488 Milwaukee avenue, Chicago. The list price is \$15.

Dempsey Air Valve

The Dempsey air valve is a new development toward bettering the volu-

metric efficiency of an engine. The air valve is attached to the cylinder block just below the waterjacket and permits of direct access to the atmospheric air through the valve. It is claimed that this valve reduces the vacuum above the piston and thus helps do away with the tendency toward oil pumping and at the same time allows more air to be taken into the cylinder. One valve is needed for each cylinder. The valve is manufactured by the Dempsey Corp., 3322 North Broad street, Philadelphia, Pennsylvania.

Electric Fuel Vaporizer

The Pomeroy patent gasifier is an electric vaporizer of the insert type, that is, it is inserted between the carburetor and the intake manifold. It consists of a thin gasket which has in the center a coil of resistance wire. This wire is attached to the storage battery through an electric switch, and when the switch is closed the resistance coil, becoming red hot, vapor-

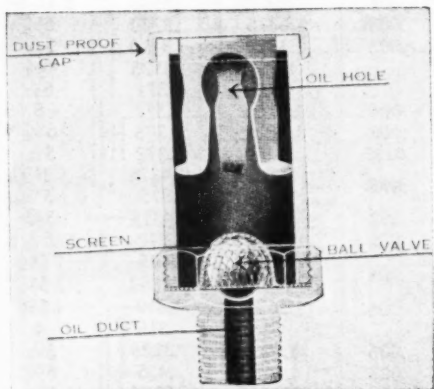
izes the particles of fuel which come in contact with it as they emerge from the carburetor. The vaporizer is made to fit all sizes of carburetors and is attached with a wrench. The device sells for \$3 and is manufactured by C. H. Pomeroy, Rochester, N. Y.

Felix Oil Cup

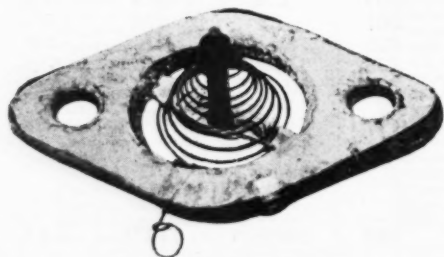
The Felix oil cup replaces grease cups and old-type oil cups on any car. It can be secured to the spring shackle bolt or steering gear and any part where a grease cup is attached. For horizontal plugs a vertical attachment is supplied. The cap of the cup can be lifted from the barrel and the barrel filled with oil from an oil can. The felt wick in the cup feeds the oil slowly to the bearings, but if it is desired to force a large amount of oil to the bearings the hand is placed over the top of the oil cup and pressure supplied. It is possible with this cup to produce an oil pressure of 200 to 300 lbs. per square inch. This is sufficient pressure to force all foreign material from the bearings. The cup is made by the Felix Mfg. Co., 4437 North Clark street, Chicago.

Kimball Tire Armor

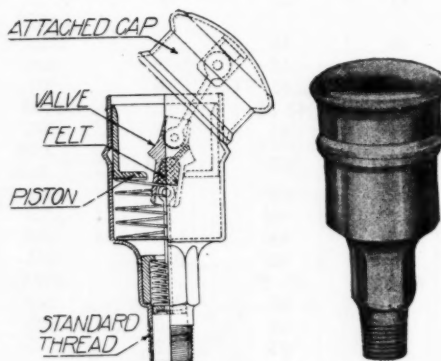
Kimball tire armor is a combination of an anti-skid chain and a tire protector. The armor is made from steel and completely incloses the tire with a series of flexible bands that completely incase this tire and are secured to the tire rim. Each band of steel is separate from its neighbor, there being about fifty separate bands applied to a 3½-inch tire. The armor can be secured to the rim by deflating the tire and inserting the hook underneath the bead of the tire with a screwdriver. Each section is about 2 in. wide, and its thickness is ¼ in., giving ample metal in the band to provide against excessive wear in hard running roads. This tire armor is made by the Kimball Tire Case Co., Council Bluffs, Iowa.



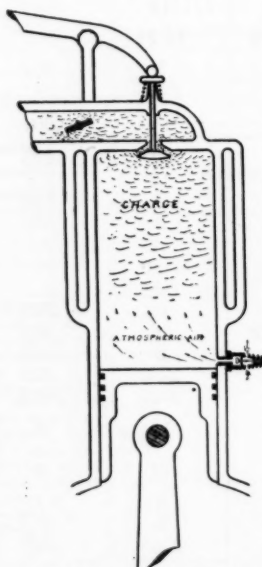
Dann oil lubricating cup



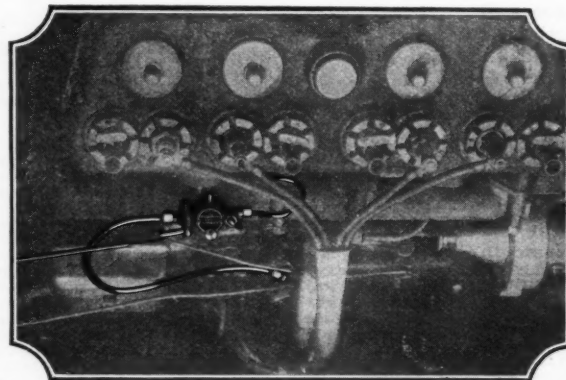
Pomeroy electric vaporizer



Felix oil cup



Dempsey air valve



Automatic steam carburetor attachment, showing installation

Service Equipment

Time Savers of the Shop

Raybestos Display Cabinet

THE Raybestos display cabinet is a silent salesman and reminds the car owner when looking over the stock of accessories that his brakes perhaps are not working and that new brake lining would be a needed service job on his car. These display cabinets are sent to any dealer or garage placing an initial stock order of not less than 500 ft. of assorted sizes of brake lining and are issued by the Raybestos Co., Bridgeport, Conn.

Safety Filter Funnel

The filter funnel shown filters engine fuel through a finely divided wire mesh and removes all traces of water and sediment from the fuel. A special triple screen is used, the fuel passing through the upper screen to a secondary passage from which it passes through another screen to the third passage and then through the final screen. The screens easily are removed and cleaned. Because this funnel uses no chamois skins to strain the fuel, it does not have the incident danger of the electric spark connected with it. It is manufactured by Conrad Ekval, Elgin, Ill.

Spark Plug Tester

It has been known for years that carbonized and cracked spark plugs often produce very puzzling results. The spark plugs with cracked porcelain seem to fire correctly in the open and sometimes even fire correctly when operating in the engine under light load, but as soon as the load on the engine is increased the serviceability of the spark plug becomes worthless, in many cases causing a great loss of time. The spark plug tester shown in the illustration tests the plug while the spark plug is inside the cham-

ber. Access to the interior of the chamber is obtained by a removable cap pressed firmly against the cylinder end with a suitable clamp. The terminal of the plug within is connected with an exterior source of high voltage electrical current through an insulated connector passing through the cap. All fixed joints are made air tight as well as the joints between the removable cap and the ends of the cylinder. The heavy glass lens

at the end of the cylinder opposite the electrode permits of observation. Compressed air then is forced into the chamber, and the sparking of the plugs can be seen while under actual working condition. This tester is being made by D. W. Morgan, Chicago.

All-Steel Bench Drawer

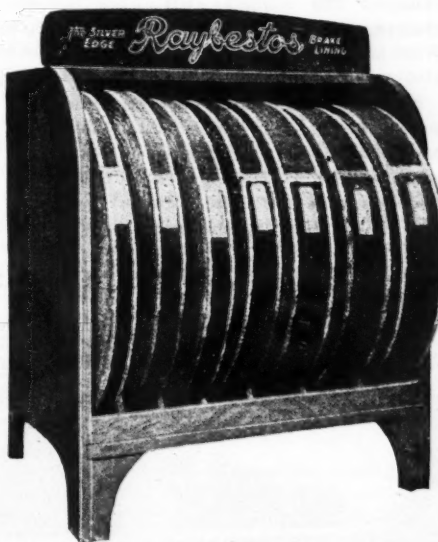
Proper equipment in the shop adds greatly to the value of the service. The benches, for instance, when equipped with drawers offer suitable protection for the care of the tools and also the work bench is kept neater and free of tools. The bench drawer shown in the illustration can be applied to any bench. It is made of steel and is fitted with a steel top which prevents access to it except by opening the drawer, that is, it is not possible to remove anything from the drawer by reaching in under or in back of it. This bench equipment is made by the New Britain Machine Co., New Britain, Conn.

Vanderpool Vulcanizing Equipment

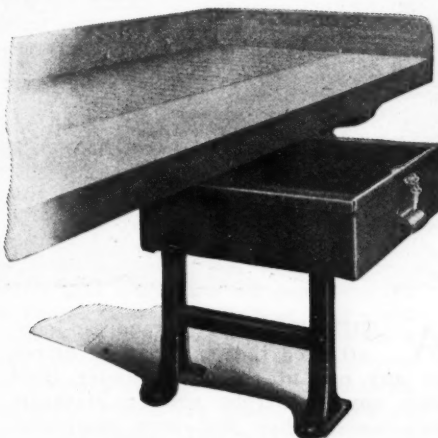
A five-capacity combination vulcanizer manufactured by the Vanderpool Co., Springfield, Ohio, is shown on this page. It has a self-contained steam boiler fitted with water gage and steam pressure gage. The boiler is of tubular and coil construction and can be had with gas or gasoline burner. The five cavities have tire capacities from 2½ in. to 5 in., tires all being approximately of the third circle size. In addition to the cavity vulcanizing thread there is supplied with this vulcanizer a tube vulcanizing plate.

Northwestern Iron Cement

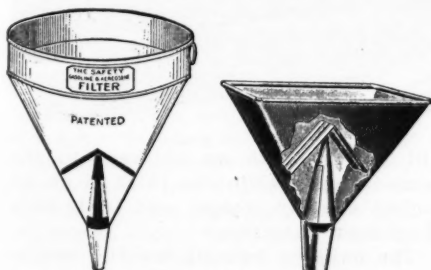
The Northwestern Chemical Co., Marietta, Ohio, has prepared an iron cement which it is said will permanently repair cracks, blemishes and holes in iron and steel castings. It can also be used for leaky radiators and water pipes. The material is in powdered form and for application is mixed with water. It is sold in cans of three sizes, 6-oz., 1-lb. and 5-lb.



Raybestos display cabinet



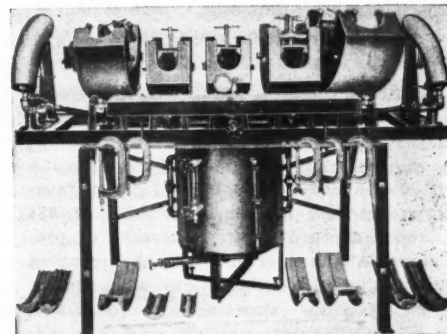
New Britain all-steel bench drawer



Safety filter funnels



Morgan spark plug tester



Vanderpool vulcanizing equipment

Among the Makers and Dealers

Short Trade Notes

TAYLOR Is Garford Foreign Representative—S. A. Taylor has been appointed foreign representative of the Garford Motor Truck Co., Lima, Ohio. He is leaving on a trip to Africa and the Far East in the interests of the company.

Distributor for Gary at Cincinnati—The Gary Truck Sales Co., which has absorbed the Motor Truck Service Co., has been appointed distributing agent of the Gary trucks in the Cincinnati territory. At the head of the Cincinnati distributing organization are Joseph Bauer, Alfred Banholzer and A. Nelson Pope.

Cason to Build Extensive Garage—Ben Cason, who has long been identified with the trade in New Orleans, La., has purchased sixteen lots and the buildings thereon in the heart of the uptown business section and will remodel the whole collection of buildings for his garage and repair plant. The property extends eight lots on Perdido street, four on Dryades street and four on Union street, all but four of the lots being covered by two-story brick buildings.

Grimes Joins Root & Van Dervoort—Charles P. Grimes has been appointed development engineer of the Root & Van Dervoort Engineering Co. and will have charge of the dynamometer testing laboratory to be installed. Previously he has been with the Wheeler-Schebler Carburetor Co., Indianapolis, and with the National Motor Car & Vehicle Corp., Indianapolis, and during the war worked at McCook Field, Dayton, Ohio, supervising the installation of electrical dynamometer and other testing equipment for the Liberty engine.

New Orleans Distributor Opens Cuba Branch—Expansion seems to be the order of the day on gasoline row in New Orleans. The Raleigh Motor Co., which handles the products of the Southern Motor Mfg. Association of Houston, Tex., is opening branch offices in Havana for better distribution in Cuba and is having plans made for a new building mainly devoted to display rooms in the Crescent City. Oliver Montagnet is president of this company; Frank Einstein, vice-president; Adolph Bruguiere, secretary, and C. Greco, treasurer.

To Build Oakland Administration Building—Construction of an administration building for the Oakland Motor Car Co., to cost in the neighborhood of \$250,000, will commence soon. It will be a four-story structure having a frontage of 384 ft. and a depth of 54 ft. Increase of production in the last few months, coupled with the need for adequate office space, necessitated the expansion. Not only will the executive and clerical staffs be afforded sufficient room, but the extra fac-

tory space which will be released when the present offices are moved from the main building will facilitate certain other increases in production capacity.

First Electric Garage for New Orleans—The Hanemann Motor Co., organization of which has just been completed, is building the first exclusively electric garage in New Orleans, La. It will have a capacity of fifty electric cars a day. P. B. Hanemann, recently connected with the Commercial Electric Co. and the White Co., will be in charge. The company will have the exclusive agency for the products of the Ward electric trucks. Industrial tractors also will be handled.

Combine to Furnish Parts Service—The Frank Weinberger Automobile Parts Co., New Orleans, La., organized to furnish parts service to owners of the Cole, Saxon, Reo, Winton, Allen and Mitchell cars, and said to be the first company of its kind

in the United States, has been organized by members of the Allen Sales Co., the King Motor Car Co. and the Sherrouse Motor Car Co., distributors of these cars. Frank Weinberger, of the Allen company, conceived the idea, and so his name was given to the new company.

Wetmore to Distribute Locomobile—F. R. Wetmore, who has been connected with the Locomobile Co. of America in territory and branch sales work for nine years, has opened offices in New Orleans, La., as distributor for Locomobile and Riker trucks.

Big Business Divides Firm—On account of large business the Fairchild Motor Car Co., New Orleans, La., distributor of the Dodge and Peerless, has separated, the Dodge firm retaining the firm name and the Peerless becoming the United Motor Car Co. The latter will take on the Liberty also. The United is erecting a 64 by 172 ft. building, two stories high, on the row.

Taking Advantage of Site to Eliminate Elevators



A THREE-STORY garage, so constructed that cars can be driven to any one of the floors under their own power, thereby making elevators unnecessary, has just been completed in Washington, D. C., as an adjunct to a mammoth new hotel. The building has a capacity for 300 cars. The novel feature which makes it possible entirely to eliminate elevators in the building is the result of the latter's being built in the side of a steep hill. This has permitted the construction of a driveway which divides into three parts, one of which leads to the first floor entrance level with the street, a second of which rises somewhat with the slope of the

hill and leads to an entrance to the second story, while the third is on an incline slightly steeper and leads to a third-floor entrance.

The building housing the 300 cars is well lighted at the front and on one side on the first and second floors, but the hill slope into which the structure is set shuts off the light from the two remaining directions. The top floor, however, is well lighted from all four sides and from it a stairway leads upward to ground level with the main floor of the hotel, which is still farther up the slope. The garage is of fire-proof construction and measures 115 by 130 ft.

The Fairchild will remain in its present quarters. The company sold 650 Dodge Brothers cars last year, and the increase in sales of this car is given as the reason for the division.

Peterson Heads Buffalo Branch—E. T. Peterson, formerly district sales manager for the Commercial Car Unit Co. of Philadelphia, has been made manager of the Buffalo branch of the Pennsylvania Rubber Co.

Lees Is Willys Light District Manager—Robert C. Lees, formerly special representative for the Overland and latter distributor for the company at Birmingham, Ala., has been appointed manager of the St. Louis district for the Willys Light.

Triangle Truck to Double Capacity—The Triangle Truck Co., St. Johns, Mich., is considering the enlargement of its plant to double the present capacity. Plans are also under consideration for the manufacture of a new 3½-ton model truck.

Kretzer Goes to Cuba for Gibson—Frank Kretzer, for nine years identified with the Gibson Co. of Indianapolis, has gone to Cuba to look after the interests of the company in Cuba, the West Indies, Porto Rico, Jamaica, the French West Indies and the Dominican Republic.

F-W-D Truck in Indianapolis—The Master Truck Co., Indianapolis, has been named the Indianapolis agent for the F-W-D truck made at Clintonville, Wis. The Indianapolis agency is a branch of the Indiana Wagon Co., state distributors, with branches also at Fort Wayne and Terre Haute.

Ford Dealer Opens New Service Station—The Lucas Auto Sales Co., Ford dealer, Toledo, Ohio, has opened a new four-story service station. The building is 60 by 160 ft., with a total floor space of 54,000 sq. ft. About 4,000 sq. ft. will be devoted to service, 4,800 ft. to salesroom, offices and restrooms, and the parts department will occupy a space of 20 by 120 ft.

Gray & Davis Increase Stock—Directors of Gray & Davis have recommended the issuance of 54,452 shares of common stock, doubling the present common share capital. New stock will be offered to shareholders at \$35 a share, one for every share of old. The additional capital will be used for increasing business. The present preferred stock and bonds of the Cambridge plant will also be retired.

Cleveland Tractor Will Add—The Cleveland Tractor Co. plans the construction of two additional buildings costing approximately \$400,000. One building will be 182 by 440 ft., one story high, and will be used as an engine shop. The second building will be 90 by 190 ft., two stories in height, and will be used as a heat treating plant. These two structures will give the company about 310,000 sq. ft. additional floor space.

Weaver to Head New Hyatt Department—H. G. Weaver will be in charge of the sales promotion department recently organized by the Hyatt Roller Bearing Co., Chicago. He has spent the last year making an investigation of the power farming machinery industry through farmers and dealers. George H. Woolley, Jr., will be a

special representative of the new department, devoting his efforts to trade research work.

Jordan Declares Dividend—The Jordan Motor Car Co. has declared an initial dividend on the increased issue of preferred stock. The dividend was declared on the basis of 1½ per cent and is payable Oct. 1 to stockholders of record Sept. 20.

Monroe Brothers to Sell Monroe Cars—Monroe Brothers, Detroit, have been appointed distributors for the Monroe for Michigan. The Monroe brothers, R. O., who will act as sales manager, and R. W., who is in charge of service, are both sons of the designer of the Monroe. They have established a temporary sales and service station but will soon open permanent headquarters on the row.

Wadsworth Elected Vice-President—Maj. George R. Wadsworth has been elected second vice-president of the United Aircraft Engineering Corp. He is in charge of the transportation development work, which includes the establishment of municipal landing fields and air routes in all parts of the country for passenger carrying and light express. During the war he was chief engineer of the naval aircraft factory at Philadelphia.

Edison Battery Promotes Kelly—John Kelly, for nine and a half years New York district manager of the Edison Storage Battery Co., has been appointed general sales manager of the company with headquarters in Orange, N. J. This promotion follows his appointment July 1 as assistant general sales manager. His previous experience was with Westinghouse Storage Battery Co., the Firestone Tire & Rubber Co., and the Swinehart Tire & Rubber Co.

Martin-Parry to Enlarge—The plant of the Martin-Parry Corp., maker of bodies, is to be enlarged. Double the present capacity is necessary to take care of orders. The plant will be rearranged and additions built. With the larger use of the truck and delivery cars, business men are paying attention to properly designed bodies as a means of increasing the efficiency of transportation service, according to R. P. Henderson, sales manager of the Indianapolis plant.

Sewell Opens Seven More Branches—The Sewell Cushion Wheel Co. is opening branches in Dallas, Memphis, Omaha, Salt Lake City, Los Angeles, San Francisco and Portland, Ore. Walter T. Sewell, who has completed a tour of the western states, reports that truck and car conditions on the Pacific Coast are the best that could be asked for. The Detroit office reports a large percentage of increase in orders over any previous year's business and that all production efforts are unable to keep up with the demand. This makes a total of thirty-seven branches to date.

Building Million-Dollar Garage—The Ninth Street Garage, Cleveland, will erect a garage which is said to be one of the largest and most complete in the Middle West. The building will be eight stories high and will cost around \$1,000,000. It will cover a ground space, 370 ft. on St. Clair avenue, northwest, by 97 ft. on East Sixth street and extend 167 ft. to Theresa Court, northeast. The garage will contain a double spiral ramp running from the

basement to the eighth floor, elevators being eliminated entirely. Completion is scheduled for early next spring.

Maccomb to Represent Weldely Motors—Henry G. Maccomb has been made New York representative of the Weldely Motors Co., Indianapolis, Ind.

Hartman Heads Advance Rubber Branch—William J. Hartman, for many years at the factory of the Advance Rubber Co., New York, has been placed in charge of the company's new branch in Los Angeles, Cal.

Brethaur Is Now With Olymplan—C. J. Brethaur, formerly with the Commerce Motor Car Co., and later with the Walden-Shaw Taxi Co., has been made production manager of the Olymplan Motor Car Co., Pontiac, Mich.

How's This for Garage Building?—Wilmington, Del., soon is likely to be known as the city of garages. For the past eight months permits have been issued for 518, some public and some private, more than two a day. The record for August was 132.

American Truck Divisional Sales Managers—The American Motor Truck Co. has appointed four new divisional sales managers, namely, W. F. Lehman, Wright Gillies, M. A. Wiltenstein and W. D. Paine. All four men are well known in the industry.

Knight Joins St. Louis Case—F. C. Knight has been appointed assistant manager of the J. I. Case Plow Works, St. Louis, Mo. Mr. Knight has been in the implement and tractor field for the last fourteen years and has recently returned from overseas service.

Chicago Ford Agency Changes Hands—The Platke & Beduhum Co., Chicago Ford dealer, has sold out to the J. J. Wright Motor Car Co., and the business hereafter will be conducted under the latter name. Mr. Wright was formerly manager of the Memphis branch of the Ford Motor Co., and later of the St. Louis branch.

Boring and Grinding at One Setting—The Standard Tool & Engineering Co., South Bend, Ind., will shortly put on the market an invention for boring and grinding engine cylinders at one setting. M. L. Williams and George L. Cole, the inventors of the new device, have asked for patents on all the parts that go to make up the machine.

Reeke Concentrates Nash Territory—The Alfred Reeke Co., Milwaukee, Wis., formerly state distributor of the Nash truck in Wisconsin and wholesale and retail dealer in the Nash car in Milwaukee and vicinity, has relinquished the state truck franchise to concentrate on wholesale and retail business in both cars and trucks in Milwaukee and adjoining counties.

Federal Rubber Establishes Warehouse—The Federal Rubber Co., with main factories and general offices at Cudahy, Wis., has established a wholesale distributing warehouse to handle the Wisconsin and upper Michigan territory. J. A. Fitzgerald is manager. The retail store formerly conducted by the Federal company has been taken over by the Federal Tire & Supply Co., with a south side store.

From the Four Winds

Glimpses at the World of Motordom

GUIDE Posts Erected on Highway—Five hundred guide posts covering ten roads entering Memphis are being erected under the truck division of the Memphis Automobile Club.

Wadsworth Heads Warren Club—J. X. Wadsworth has been elected president of the Warren Automobile Club, succeeding F. F. Bentley, who has served as head of the club since its organization about four years ago. E. A. Osborne was elected vice-president; Miss Clare Smallwood, secretary, and J. E. Beebe, treasurer.

Carroll County Motorists Organize—The Carroll County Automobile Club has been organized by motorists from practically every part of the Ohio county. E. L. Henderson was made president; L. D. S. Klotz, vice-president; W. S. Long, secretary, and J. L. Heiniger, treasurer. Representatives were selected from the various townships in the county. The association will affiliate with the Ohio Automobile Association.

Road Contract Under New Iowa Law—The first contract for paving of Iowa roads under the new road law passed by the last Iowa legislature was let for 5 miles of road connecting Cedar Falls and Waterloo. The paving will be of brick with asphalt filler. The price per mile is \$39,388.80, slightly under the estimates of the paved roads advocates in their campaign when they told the voters the roads could be built for \$40,000 per mile.

Motor Buses Gather School Children—To encourage consolidation of rural schools, so as to provide better educational facilities than is possible at present, the New Castle County board of education in Delaware has ordered four motor buses, each with a capacity of from twenty-five to thirty children, to carry the

pupils to and from distant schools. One of each of the following makes has been ordered: Maxwell, Reo, Oldsmobile and Ford. It is expected to have the cars ready for use some time next month.

Chase Heads Richland Club—L. C. Chase has been elected president of the Richland Automobile Club. E. F. Wickwire, who has been serving as president since the formation of the club, declined reelection. W. W. Van Horn was elected vice-president; and C. E. Ozier, treasurer.

More Road Money for Ohio—The new road bill in Ohio went into effect Aug. 28, and as a result the Ohio highway commission and motorists generally are very much elated. The new law provides for a levy of 5/10 mill instead of 3/10 mill. This will mean about \$4,000,000 for road improvement next year. The law provides that the various counties must put up 50 per cent, and in many cases more; thus about \$12,000,000 comes from that source. Taking the Federal Aid funds, it is estimated that \$20,000,000 will be available for road improvement and maintenance in Ohio in 1920.

Friendly Rivalry Combines for Signboard—The rival towns of Yakima and Wenatchee, Wash., both important fruit-growing centers, have settled a controversy of years over erection of a signboard for motorists at the junction of the Sunset and Inland Empire highway. Representatives of the two towns formally agreed on erection of a large signboard at this junction, to have on it a map of Central Oregon, showing all important towns and the distances between them. The map is to be sketched and submitted to the two communities for approval before the sign is made. In addition to the map, there will be two 16-ft. arrows pointing re-

spectively to Yakima and Wenatchee. Due care will be observed that neither the Yakima or Wenatchee arrow is longer than the other.

Eight Truck Routes in One County—A survey of the development of truck lines in Ohio, made by the state bureau of markets and marketing in thirty counties shows Franklin county leads the list in this development with eight routes in operation. The terminal points of the routes are Sunbury, Hebron, Granville, Newark, Columbus Center, Summitt Station and Pataskala. The bureau finds milk one of the chief commodities transported by these lines.

Ohio Road Information Bureau—The Ohio state highway department has undertaken a new activity which will be welcomed by motorists generally. It is the establishment of a road information bureau to furnish data on roads in every section of the state. The information to be collected will be furnished to the Motor Transport Corps of the War Department and to the general public. This information is to be sent out in the form of circulars.

To Make Everyone Do Something—The Bay State A. A. has sent a request to the Massachusetts Highway Commission that it go through with its plan of a year ago not to register any motor car in Massachusetts whose owner has made no attempt to obey the headlight law. A year ago the club requested the commission to place on its renewal blanks the question, "Have you equipped your car with any device to try to obey the headlight law?" And those who answered no were not to get any numbers. As any one who answered yes and had not done so would be liable for perjury, because all applications are sworn to. It is not expected that many would take such a chance. The commission is getting ready for the work of reregistering now.

Municipal Motors in Wisconsin to Register—Municipally owned motor vehicles, including fire and police cars and trucks of all kinds, must be registered in Wisconsin the same as privately owned cars and at the same rate of fee, according to a new law enacted by the Wisconsin legislature of 1919. Heretofore municipal cars and apparatus have been exempt from payment of annual license fees. Earlier in the session the legislature passed a law providing for a special fee of \$3 for municipal vehicles, exempting such as carried the initials of the city and department in bold letters on the body of the car. This provision was repealed as the session came to a close and municipal cars were placed on the same basis as others, excepting only in reference to violation of speed laws. Fire and police cars, when on active duty, are exempted from the speed restrictions, however.

Coming Motor Events

TRACTOR DEMONSTRATIONS

Los Angeles, Cal. Regional Demonstration September
Ottawa, Ontario Tractor and Farm Machinery Oct. 14-16

RACES

New York Speedway Sept. 20
Cincinnati, Ohio Speedway Oct. 1
Los Angeles, Cal. Ascot Speedway Nov. 27
Los Angeles, Cal. Ascot Speedway Dec. 29

SHOWS

Toronto, Canada Canadian National Exhibition Aug. 23-Oct. 6
Cincinnati, Ohio Automobile Dealers' Association Sept. 13-20
Springfield, Mass. Eastern States Exposition Sept. 15-20
Waterloo, Iowa Black Hawk County Motor Trades Bureau Sept. 22-28
Detroit Dealers' Association, closed car salon Oct. 6-11
Chicago Automotive Equipment Association Nov. 3-8
New York N. A. C. C. Jan. 3-10
Chicago N. A. C. C. Jan. 24-31
Kansas City, Mo. Kansas City Tractor Club February
Wichita, Kan. Wichita Thresher-Tractor Club Feb. 9-11

PNEUMATIC TRUCK TIRES

These "giant" tires are no longer an experiment—they have proved out. And yet their successful performance is dependent on proper inflation. This means air in heavier volume, and at higher pressure than ever needed for passenger car tires.

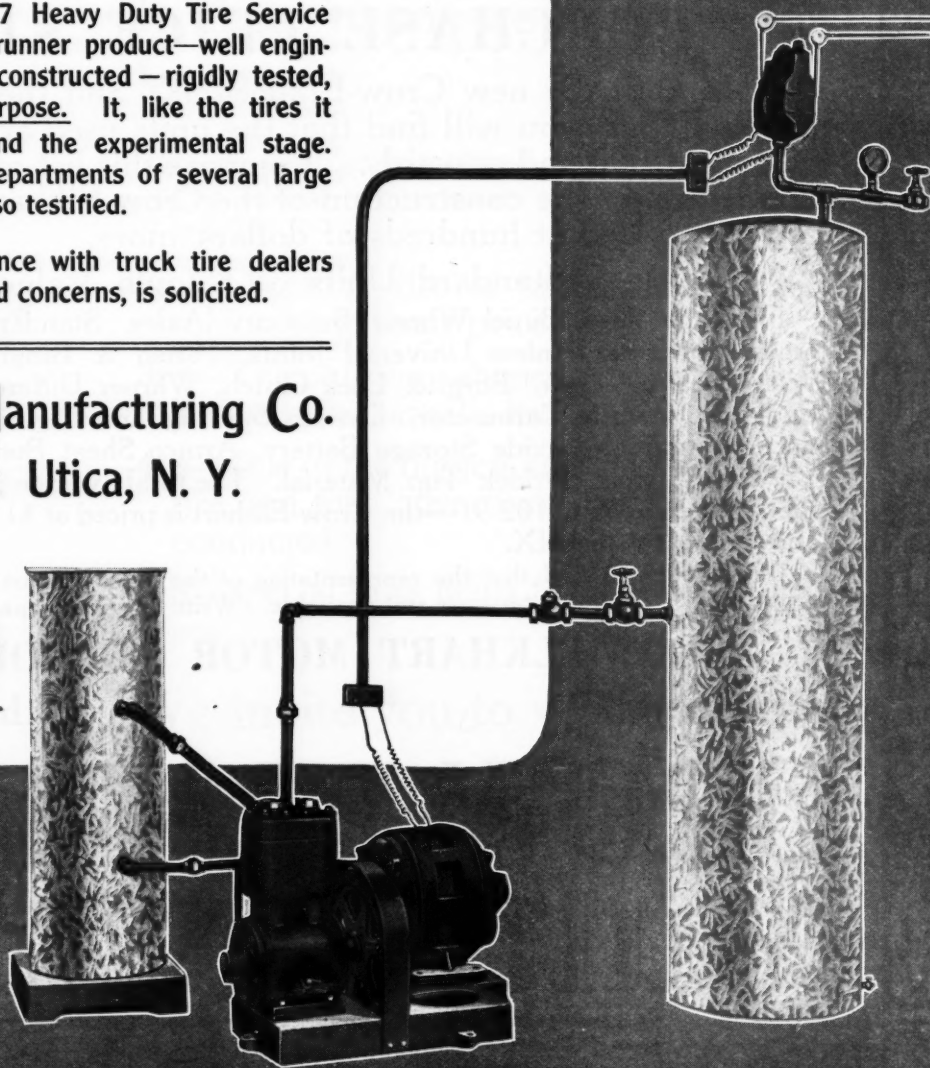
The progressive service station cannot afford to be without equipment for attracting this trade. Trucks are operated generally by most desirable customers.

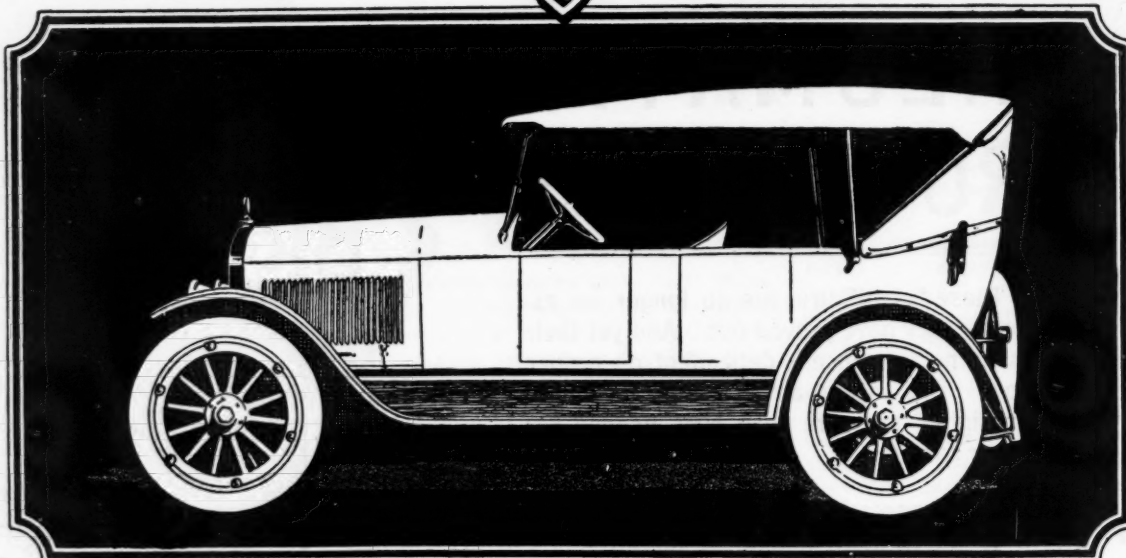
The No. 247 Heavy Duty Tire Service Outfit is a true Brunner product—well engineered—carefully constructed—rigidly tested, and suited to its purpose. It, like the tires it will serve, is beyond the experimental stage. The engineering departments of several large tire factories have so testified.

Correspondence with truck tire dealers and other interested concerns, is solicited.

Brunner Manufacturing Co.
Works: Utica, N. Y.

Sales Offices:
UTICA, N. Y.
CINCINNATI, O.





\$2000 CONSTRUCTION PURCHASE PRICE \$1195

In both the new Crow-Elkhart SIX and the staunch long-stroke FOUR you will find that the units used are those of cars costing \$2000 and upwards. Compare this list of proved equipment used in the construction of the Crow-Elkhart with those of any car priced at hundreds of dollars more.

Standard Units of Known Value

Firestone Tires, Bimel Wheels, Salisbury Axles, Standard Springs, Thermoid Hardy Frictionless Universal Joints, Parish & Bingham Frame, Detwiler Steering Gear, Borg & Beck Clutch, Warner Differential, Jamestown Radiator, Zenith Carburetor, Dyneto Starting and Lighting System, Connecticut Ignition, Exide Storage Battery, Armco Sheet Body Metal, Stewart Vacuum System, Dridek Top Material. The total average price of cars using the listed units is \$2102.91—the Crow-Elkhart is priced at \$1195 for the FOUR and \$1545 for the SIX.

DEALERS will find that the representation of the Crow-Elkhart is an unusual profit proposition. Desirable territory still available. Write or wire for particulars.

CROW-ELKHART MOTOR CORPORATION

Dept. 101

Elkhart, Ind.

CROW-ELKHART Multi-Powered

MICHELIN

AN OPPORTUNITY

Notwithstanding the popularity of Michelin Tires, there are some towns where dealers can still secure this valuable account.

In these towns we offer the following:

1st—A thoroughly tested cord tire, made by the oldest pneumatic tire maker in the world.

2nd—A fabric tire of unsurpassed quality sold at a moderate price.

3rd—The only ring-shaped tube on the market—a tube that sells itself.

4th—One of the biggest and most impressive tire and tube advertising campaigns ever conducted.

5th—Special sales helps for individual dealers.



We invite you to write us now.

MICHELIN TIRE COMPANY

Milltown, New Jersey



IT is unusually significant that a big majority of manufacturers of better cars, specify Hayes Wire Wheels as their standard wire wheel equipment. It is, of course, almost universally recognized that the Hayes is infinitely smarter. That, alone, would be sufficient reason why Hayes Wire Wheels are so widely preferred by owners of all types of cars. But durability, safety and fine workmanship

are even greater consideration among motor car engineers and manufacturers.

For instance, actual service shop records show that spoke replacements, in the Hayes—and spokes are almost the only parts that are ever broken—are less than 50 per cent of those in other construction. Hayes service stations in some cities regularly supply Hayes spokes to many users of other wheels, because their superiority is recog-

nized.

Hayes Wire Wheels are the only ones with enclosed driving studs. Engineers largely base their preference on this feature, because enclosed driving studs give a greater factor of safety, in 20 per cent to 25 per cent greater driving bearing service.

DEALERS: Wheels which most of the manufacturers specify as equipment for their cars are good wheels to sell. Write for our exceptional dealer proposition.

Wire Wheel Division **Hayes Wheel Company** Jackson, Michigan

World's Largest Builders of Wheels—Wire, Wood, Steel

Distributors:

Motor Equipment & Tractor Co.
1310 S. Grand Ave., Los Angeles, Calif.
C. H. Carter
724 Van Ness Ave., San Francisco, Calif.
Broadway Tire & Rubber Co.
Oakland, Calif.
Automotive Supply Co.
1558 Broadway, Denver, Colo.

Brigman Motor Sales Co.
491 Whitehall St., Atlanta, Ga.
Chicago Wheel & Rim Co.
2010 Wabash Ave., Chicago, Ill.
Mitchell & Smith, Inc.
1090 Commonwealth Ave., Boston, Mass.
Siggins Sales Company
106-108 Milwaukee Ave., Detroit, Mich.

Auto Marine Service Co.
1027 Nicollette Ave., Minneapolis, Minn.
Hayes Wire Wheel Sales Corporation
842 Seventh Ave., New York, N. Y.
Samuel Scott
2038 Ranstead St., Philadelphia, Pa.
Miller & Woodward
3751 Bigelow Blvd., Pittsburgh, Pa.

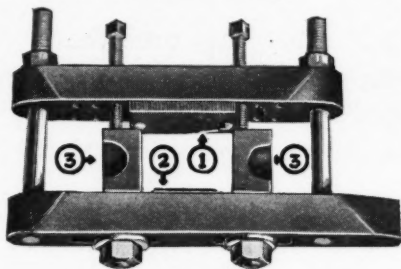
HAYES Wire Wheels

This Hand Tool Revolutionizes the Work of Crankshaft Grinding

You will never again putter over the impossible job of scraping bearings to flat crank pins.

You will stop handing over to some out-of-town machine shops those \$10 to \$25 profits that rightly belong to you.

The hand tool for crank-shaft grinding has come to stay. Now it's only a matter of which to buy.



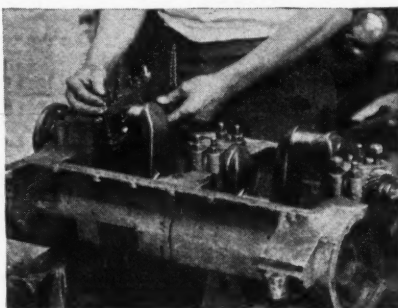
1. Hardened and tempered steel cutter. Cuts in one direction only.

2. Bronze track bearing. Cannot cut ring in pin like hard steel nor freeze against pin from excess friction like soft steel.

3. Adjustable Abutment Blocks.

Your work never justified the cost of a lathe. Neither does it justify the purchase of a hand tool costing from five to ten times as much as an Atlas Abrasive Tool (Patented).

You may have only one crankshaft grinding job a year—yet that one job pays for the Atlas.



Works without removing crankshaft from car

It's a fact that you don't even need to remove a crankshaft from the crank case. You can true up an entire crankshaft within an hour's time. And make it accurate within one thousandth of an inch. This is better than any machine shop will guarantee with the use of a lathe.

You can do all this and more with an Atlas Abrasive Tool. You can adjust it to fit any pin from $1\frac{1}{4}$ " to $2\frac{1}{2}$ " dia. which is large enough for all pleasure cars and trucks.

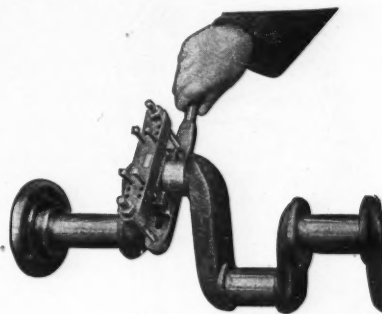
Just as your profits will increase with the use of an Atlas Abrasive Tool, so will your costs decrease.

No car owner will put up with days, or perhaps weeks, of delay, when he

knows how little time it takes your shop to true up his crankshaft and have his car ready.

You can laugh at the fellow with a lathe. You can make your competitor's crankshaft grinding costs seem prohibitive.

Can you doubt that with an Atlas Abrasive Tool, new trade will come your way? Hundreds of garages and repairshops—big and little, are using the Atlas.



The quick, easy, simple, convenient and inexpensive way to do crankshaft grinding.

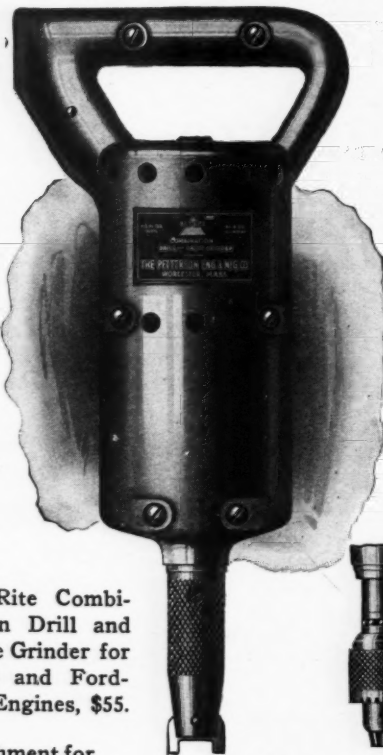
Its price, complete, postpaid is only ten dollars. Extra cutters (including extra track bearings) good for from ten to twenty pins or bearings, cost 30c each.

Wire your order today. Money back, but you won't ask for it.

Atlas Manufacturing Co.

North Canal St.

Pittsburgh, Pa.



Bilt-Rite Combination Drill and Valve Grinder for Ford and Fordson Engines, \$55.

Attachment for Franklin and Buick valves.
\$1.00



Chuck for drills up to $\frac{3}{8}$ inch.



Grind Valves

It's easy to pick the repairman who is getting ahead. His shop is well lighted; he uses plenty of labor-saving machinery. He has a cylinder re boring device, a set of machines to replace Ford and Fordson bearings. He grinds valves with a

Bilt-Rite *Electric Valve Grinder*

and does a first-class job in much less time than by hand. Time saved on a repair job at other points is no longer wasted in waiting for valve-grinding; the Bilt-Rite keeps work "on the Move."

Plug into any lamp socket; the Bilt-Rite's universal motor cuts out end-of-the-day fatigue. Its steady back-and-forth motion grinds the last set of valves just as perfectly as the first.

The Bilt-Rite Electric is a portable drill, too. Just a screw driver and a few seconds make it ready for the drilling you have to do on many jobs. So all day long, the Bilt-Rite is busy saving you time and fatigue.

A workshop is known by its tools; how does YOURS measure up?

The
FAIRBANKS
Company

Sole Distributors for
The Service Station Equipment Company
The Hempy-Cooper Manufacturing Company
The Peterson Engineering & Manufacturing Co.
The Groetken Pump Company and other manufacturers of garage equipment



MILL, MINE AND RAILWAY SUPPLIES SCALES VALVES POWER TRANSMISSION MACHINE TOOLS

the Modern Way

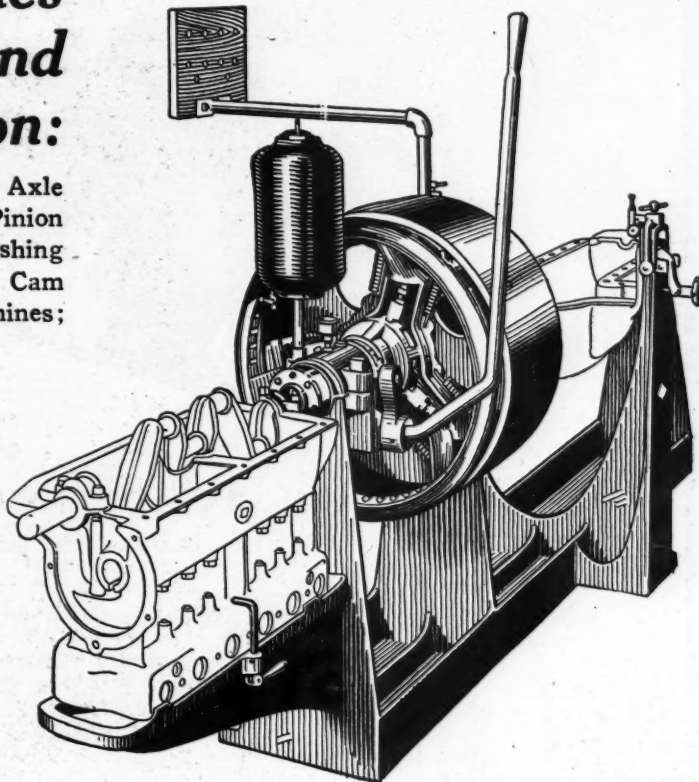
American Junior Bearing Burning-In Machine

Finishes the bearings on a Ford engine to a perfect surface in 5 to 7 hours less time than by hand. Price \$197.50 F. O. B. Chicago, including gasoline tank, coil box holder, water connections and set of blue prints.

Profit-making machines and tools for the Ford and Fordson Service Station:

Bearing Burning-in Machine for Ford and Fordsons; Motor Test Stands; Engine and Axle Stands; Bearing Boring Machines and Re-Babbling Jigs; Cylinder Re-boring Machines for Fords and Fordsons; Straightening Presses; Arbor Presses; Power Grinders; Air Compressors; Transmission Reaming Machines; Special Ford Reamers; Rear Axle Sleeve Pullers; Radiator Test Plugs; Piston Clamps; Connecting Rod Straightening Jigs; Bench Motor Clamps; Transmis-

sion Drum Clamps; Rear Axle Pinion Gear Presses; Pinion Gear Pullers; Piston Bushing Reamers; Crank and Cam Shaft Testing Machines; Emergency Wheel Clamps; Wheel Pullers; Valve Port Renewing Tools; Bushing Drivers; Turning Bars; Speed and L Wrenches; Special Jacks; Rim Tools; Tow Bars; Combination Electric Drills and Valve Grinders; Visible Measuring Gasoline Pumps; Special Ford and Fordson Tools and Machines.



All this equipment is guaranteed by
"The Fairbanks Company O. K."

Write for Catalog 8, just issued

THE FAIRBANKS COMPANY

ADMINISTRATIVE OFFICES:—NEW YORK

BRANCH HOUSES

Albany
Baltimore
Birmingham
Boston
Bridgeport

Buffalo
Chicago
Detroit
Havana, Cuba

Hartford
Newark
New Orleans
London, England
Birmingham, England

New York
Paterson
Philadelphia

Pittsburgh
Providence
Rochester

Glasgow, Scotland
Paris, France

Scranton
St. Louis
Syracuse
Utica
Washington

The
FAIRBANKS
Company

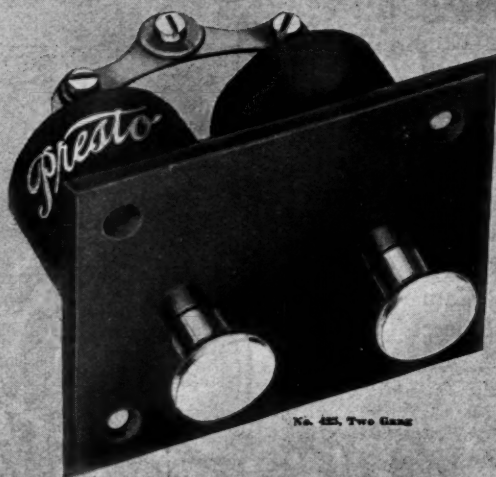


Sole Distributors for
The Service Station Equipment Company
The Hempy-Cooper Manufacturing Company
The Peterson Engineering & Manufacturing Co.
The Groetken Pump Company, and other manufacturers of garage equipment.

TRUCKS AND WHEELBARROWS ENGINES AND PUMPS AUTOMOBILE AND SERVICE STATION EQUIPMENT

Presto

Push and Pull Type Switches



No. 423, Two Gang



No. 425

The Switch with a Snap!

Neatest, Simplest and Most Easily Installed

We are showing herewith, for the first time, our very latest PRESTO PRODUCT—a Push and Pull Type Switch.

Neat Design, thorough Workmanship and highest Quality are the outstanding features.

The PRESTO Push and Pull Type Switch has already been adopted by several lamp manufacturers for their equipment business; and for this reason our production is large, and we can take care of all trade orders promptly.

These switches are made in four different combinations—either single, double, triple or quadruple style.

The PRESTO Switch body parts and plate are made of steel, and all the switch parts are thoroughly

insulated. These materials will resist intense heat and also may be subjected to rough usage.

A marked advantage of the PRESTO Switch is that the holes for the screws in the top plate are farther from the center than in other switches, and the screws will not break away from the wood, because they are not on the ragged edge. All PRESTO Switches are provided with screw terminals and connection bars for the gang switches.

The standard finish is black plate with nickel-plated knob; each switch being packed in an individual carton, handy for display and sale.

Write for full information on the PRESTO line of Dash Lamps, Connectors, Sockets, Plugs, Switches, Electric Cigar Lighters, Presto Body Braces for Ford Cars, etc.

Manufactured by

METAL SPECIALTIES MFG. CO.

338-352 N. Kedzie Avenue

Chicago, Illinois

Eastern Branch - - - - - 16-24 W. 61st St., New York

Western Branch - - - - - 149 New Montgomery St., San Francisco

Manufacturers of

Presto Products

A LINE OF OVER 100 MOTOR CAR NECESSITIES



Flexedge

**SELF-SEATING
LAMINATED VALVES**

Sensible-Logical-Inevitable

A Valve-Seat Carbon Remover at
Work While You Drive

DISTRIBUTORS.
Send for full particulars of liberal selling proposition.

FIG. 2



VALVE UNDER PRESSURE Flexation Exaggerated

DEALERS.
Send for a test pair of FLEXEDGE VALVES and give them a thorough trial.

FIG. 1



VALVE NORMAL

FIG. 3



VALVE ABOUT TO OPEN Flexation Exaggerated

**The Slight Flexation
Scrapes the Seat Constantly
keeping the metal clean and free from Carbon Deposits**

The principle is very simple—merely a construction which permits thin discs of the finest spring steel to flexate causing a slight movement which is so minute that it could hardly be called a vibration, yet sufficient to remove the tiny flecks of carbon which collect after each explosion. Automotive engineers have expressed FLEXEDGE VALVES as being one of the most notable improvements in the present era of automotive engineering.

FLEXEDGE PRICES

Ford	\$0.50 each	Oakland Six..	\$1.25 each
Chevrolet ....	.75 each	Franklin Model	
Buick D44 ...	2.00 each	B	2.00 each
Buick D45 ...	2.00 each	Saxon Six....	1.25 each
Buick D35 ...	1.25 each	Elgin Six	1.25 each
Oldsmobile 37.	1.25 each	Grant Six	1.25 each
		Oldsmobile 45.	1.25 each

FLEXEDGE DISTRIBUTORS

Eastern Distributor	Western Distributor
Federal Appliance Corp.	Joseph D. Tripp,
1966 Broadway,	909 S. Grand Ave.,
New York City.	Los Angeles, Cal.
Northern Distributor	Southern Distributor
Reinhard Bros., Inc.,	"Kant Break" Spark
Minneapolis, Minn.	Plug Co.,
	330 Madison Ave.,
	Memphis, Tenn.

SELF SEATING VALVE CO., 706-8 Townsend St., Chicago, Ill.

A product of essential value to manufacturers and users of automotive vehicles, disclosing a revolutionary advance in design, will shortly be introduced to the





*industry by the Savage
Arms Corporation—
The announcement
will appear in an early
issue of this publication*

SAVAGE ARMS CORPORATION

SHARON, PA.

UTICA

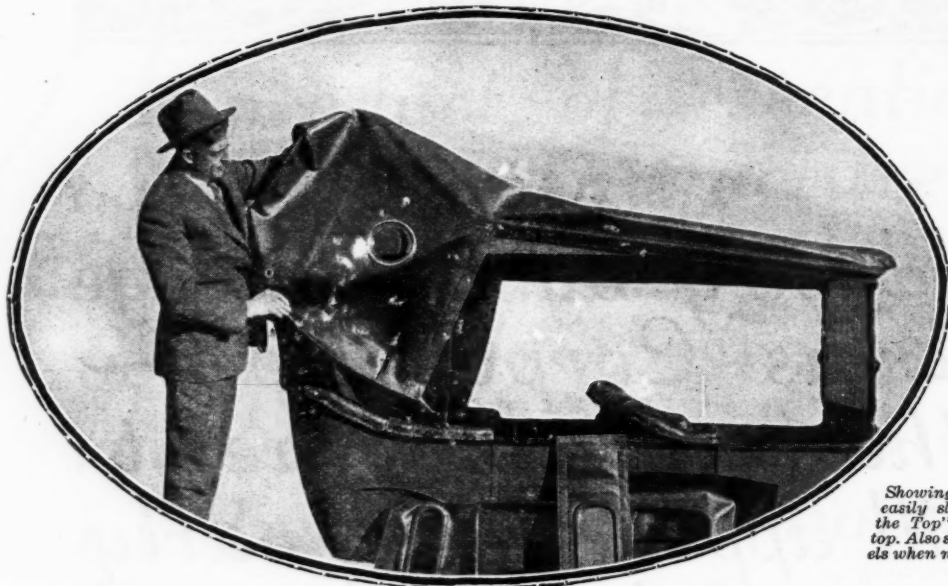
NEW YORK

DETROIT

PHILADELPHIA

SAVAGE

Protection Against Winter



Showing how one man easily slips the "Over the Top" over the old top. Also shows side panels when not in position.

"Over the Top" Auto Top

Baker "Over the Top" Auto Tops afford protection against the cold of winter. Quickly turns a touring car into a sedan. No joints to rattle. Simply slips snugly on over the old top. Can be attached to the car much easier than ordinary side curtains. Made of high grade Artificial Leather and furnished with real glass in side panels, thus giving perfect road vision, from all seats.

These tops are very popular because they are practical, dependable, and reasonable in price. Side curtains can be removed, leaving an open summer top. Have trim appearance same as regular top. No special frame. No bulky, box car appearance to cause a top-heavy feeling.

"Over the Top" Auto Tops weigh but 30 to 50 pounds. Your customer can carry one out under his arm. Require very little shelf room. There's an "Over the Top" Auto Top for all popular American made cars. Every touring car owner appreciates its trim appearance and special value. Full information on request.

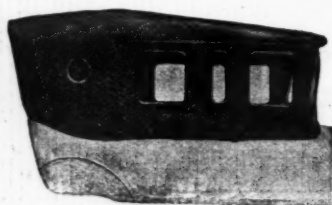
We also have ready for delivery many other popular "Baker Necessities", such as "Over the Top" Auto Tops, Anti-Draft Shields, Foot Pedal Shields, Bad Weather Mats, and Rain Guards.

BAKER AND LOCKWOOD MANUFACTURING CO.

BROOKLYN, N. Y.
473 Kent Avenue

KANSAS CITY, MO.

CHICAGO, ILL.
3021-23 Michigan Ave.



Showing the complete top with side curtains. Side panels open up with doors.

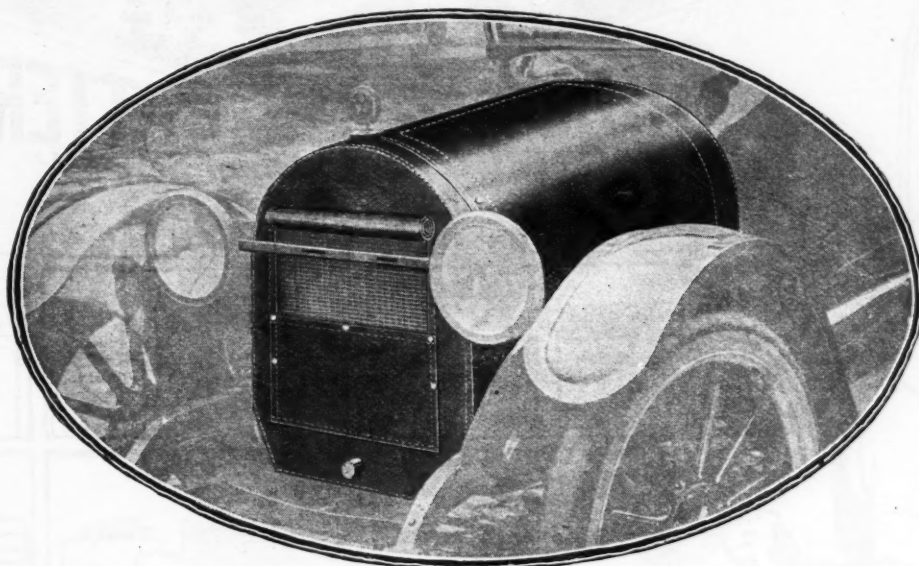


Showing the top without curtains. Can be snapped on in a jiffy.

Baker
SIGN OF THE BEST
SINCE
1870

Baker Hood and Radiator Covers

Baker
SIGN OF THE BEST
SINCE
1870



Big Business Builders for Live Dealers

Be prepared for the great demand for "Baker" Hood and Radiator Covers! With "Baker" Hood and Radiator Covers there is no longer any danger of frozen radiators or cracked water jackets. Retain this motor heat for hours. When given this protection, motors run better during the coldest weather.

Always look neat and nifty. Made of heavy, flexible and durable materials. Linings are thick and warm. Absolute protection against coldest weather.

All "Baker" Hood and Radiator Covers are sold on an absolute money-back guarantee. If they are not satisfactory as to fit and exactly as specified, we will replace free of charge.



Dealers everywhere are selling "Baker" Hood and Radiator Covers and every user is highly satisfied. Write at once for 1919 catalog which fully illustrates and describes them.

We also have ready for delivery many other popular "Baker Winter Necessities" such as "Over the Top" Auto Tops, Anti-Draft Shields, Foot Pedal Shields, Bad Weather Mats, and Rain Guards.

BAKER AND LOCKWOOD MANUFACTURING CO.

BROOKLYN, N. Y.
473 Kent Avenue

KANSAS CITY, MO.

CHICAGO, ILL.
3021-23 Michigan Ave.

VESTA

STORAGE BATTERY

"Costs less per Month of Service"



Vesta Service Stations Give Real Battery Service

This is one reason why they are so popular with the motorists and so profitable to the dealer.

Every Vesta Service Station is equipped to make repairs on any make of battery. In fact, 75% of our repair jobs are on some other make. Undoubtedly this is because some of the patented features that make Vesta batteries so durable can be used on these repairs.

Vesta Service Stations everywhere are associated for good-will. This good-will spreads rapidly among motorists, bringing them back again and again. And they tell their friends about Vesta service.

Thus the good-will spreads and the value of a Vesta dealership increases day after day.

There are still a few openings in our organization for dealers prepared to live up to the Vesta standard of service.

VESTA ACCUMULATOR CO.

2100 Indiana Avenue

Chicago, Illinois

When Springs Break, put on

VULCAN
The Replacement Spring



This is the VULCAN spring rack

The Automatic Salesman

The VULCAN Spring Rack is an efficient salesman successfully employed by over 7000 dealers. The VULCAN Spring Rack is always on the job.

During every hour of daylight, and when your store is illuminated at night, it carries this message to every motorist.

**"When your springs break, put on VULCAN,
the Replacement Spring."**

The VULCAN Spring Rack is sent free with your first order for VULCAN Springs. Write for particulars today; you will find it worth your while.

Jenkins VULCAN Spring Company
Factory, RICHMOND, IND.

Branches

Atlanta, Ga.	Dallas, Tex.	Minneapolis, Minn.	St. Louis, Mo.
Boston, Mass.	Kansas City, Mo.	Reading, Pa.	

*"I always look for
the Name"*

*More than 8
out of 10 cars are
factory equipped
with*

A black and white photograph of a man wearing a dark cap, a light-colored shirt, a dark tie, and dark suspenders. He is looking down and working on a dark-colored belt with his hands. The belt is draped across the lower half of the advertisement.

Gilmer

WOVEN ENDLESS

FAN BELTS

**"Carry
a Spare"**

A Spare Fan Belt is as necessary as a Spare Tire. Make two sales instead of one. Urge your customers to "Carry a Spare."

FAN BELT FACTS

Which every accessory and car salesman should know

ANY car owner who underestimates the importance of an efficient Fan Belt is inviting annoyance and encouraging serious engine trouble and expense.

Fan Belt quality can *not* be judged by appearance, weight or feel. Heat, oil and moisture are a Fan Belt's deadliest enemies. They are what cause ordinary belts to grow hard and stiff, and lose shape or shrink and bind, or stretch and slip, and become unfit for service long before they should. Only a Fan Belt that resists heat, oil and moisture can render efficient service *continuously*.

Eight Out of Ten Cars Are Gilmer Equipped

The big car manufacturers know this. They have conducted many hundreds of laboratory experiments and road tests to discover the Belt that could best resist heat, oil and moisture.

Almost without exception, those manufacturers who use flat belts have selected

Gilmer for standard equipment. More than 8 out of every 10 cars built are so equipped. Think it over—*more than 8 out of 10*.

And if price were a factor, not one single manufacturer would be using Gilmer Belts today, not ONE, because Gilmer Belts are the most expensive of all woven belts offered to the manufacturer for standard equipment.

Heat and Oil Proof

Thanks to the scientific process of treating woven belting, developed by Gilmer engineers, Gilmer Belts do resist heat, oil and moisture perfectly. The character of a Gilmer Belt never varies from the day it is installed on an engine until it is completely worn out.

It grips the pulley snugly—never binds, shrinks, loses its shape or grows hard and slippery. It never jams or sticks at the splice or joint—because there is no splice or joint. Gilmer Belts are woven endless. Consequently they run evenly with no strain on pulleys or bearings.

The Package Idea

Gilmer Woven Endless Fan Belts are packed in attractive "saleshelp" cartons, each containing twenty-five belts of one size to fit a group of cars. Group number and name GILMER stenciled on each belt. There's a belt for every car using flat type belts.

The carton plan of stocking Belts, originated by Gilmer, has replaced the old style method of carrying belts in bulk with its actual loss and confusion.

Most dealers find it to their interest to carry complete assortments.

Your jobber can supply you or order direct, mentioning the name of the jobber you do business with.

L. H. Gilmer Co., Philadelphia, Pa.

FACTORIES:

Philadelphia, Pa.

North Wales, Pa.

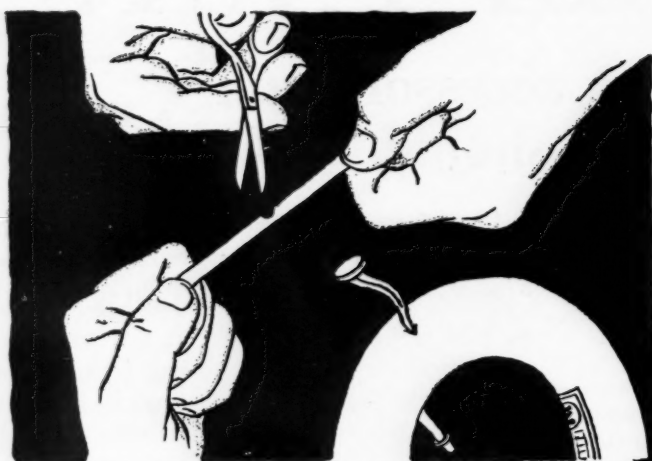
Millen, Ga.

BRANCH OFFICES:

Chicago Detroit Milwaukee

EXPORT OFFICE:

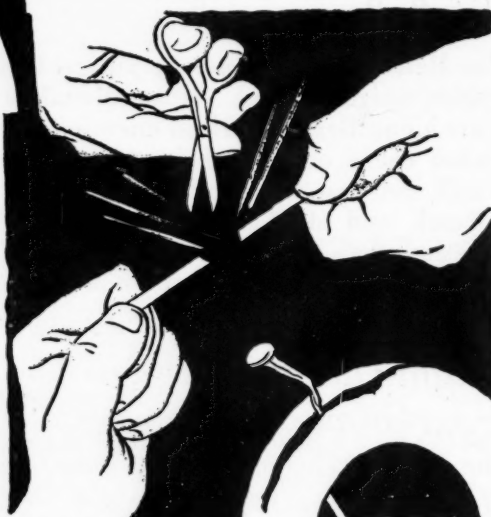
136 Liberty Street, New York



Stretch a sample strip of a good tube. That's how it is in the shoe. Cut the edge with your scissors—that's what happens when the puncture comes. It cuts—but it does not rip. Make your dealer prove that the tube he sells will stand the Norwalk test.

The Scissors Test

Take test strip $\frac{1}{4}$ in. by 3 in. Stretch to 9 in. or three times its original length. Cut on the edge with the scissors. The cut should not be more than $\frac{1}{8}$ in. across the sample. If the strip tears apart the rubber is inferior.



Here's what happens to the inferior tube when it is cut. Rip! and it tears across. The tube is ruined.

At Every Step You're Sure

With a pair of scissors today, you prove that Norwalk Tubes do not rip when cut or blown out. With the Norwalk Tube itself you realize the significance of floating stock. Greater safety because of greater strength.

And then you will ask for a Norwalk Casing—either a fabric non-skid or a cord. Both have black tread and snow white side walls.

NORWALK TIRE & RUBBER CO.

Makers of Casings, Cord and Fabric; and of Tubes, Red and Gray

Norwalk, Conn.

Export Office: 100 Broad Street, New York

DEALERS If the tubes you are now selling do not meet the Norwalk scissors test, better stock Norwalks at once. This advertisement is one of a series in which we are telling the public how to test tubes before they buy.



NORWALK

TUBES and CASINGS



GILL

The Perfect One Piece Piston Ring

This is a picture of "Mac." He is a corking good mechanic and a great booster for the Gill Piston Ring. "Mac" says you only have to show a motorist a Gill Ring to sell it and thousands of dealers all over the country have found this true to the advantage of their business.

What is the reason for this "Gill Enthusiasm"?

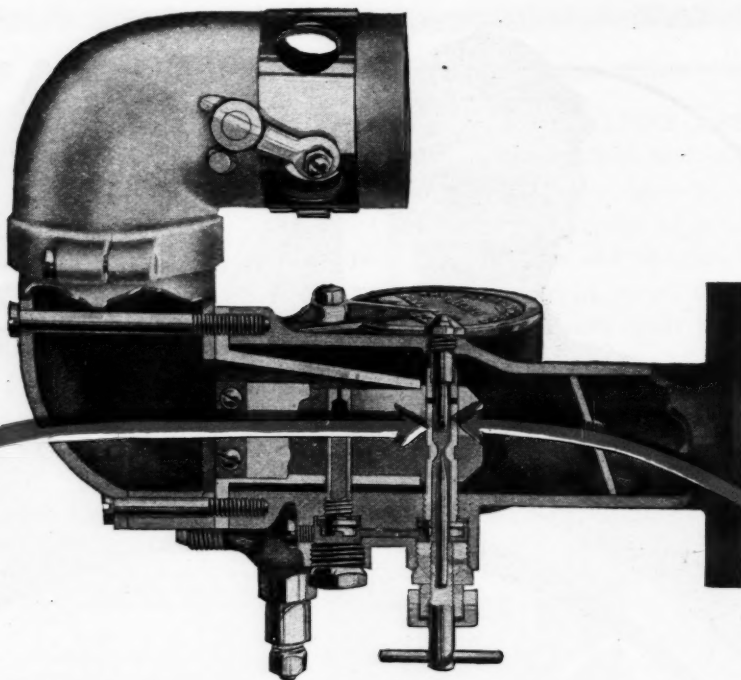
Look at the double step, interlocking joint and you will see for yourself. It allows an expansion of from $\frac{1}{8}$ " to $\frac{3}{16}$ " before any loss of compression occurs. In addition Gill Rings are made from single piece castings of special fine gray iron and machined to absolute accuracy. The easiest ring on the market to install, the easiest ring on the market to sell.

Send for the new Gill Piston Ring Size Directory, complete, convenient and full of just the information you need. It is free to the trade.

Dealers—Ask your jobbers about them
Jobbers—Write to us for information

The Gill Manufacturing Company
351 West 59th Street, Chicago, Illinois

Sole Foreign Agents:
AUTOMOTIVE PRODUCTS CORPORATION
Woolworth Building, New York, N. Y.



Tillotson

CARBURETOR

THE Tillotson air valve, when adapted to the particular requirements of a motor, responds automatically and maintains unvaryingly that same partial vacuum and high air velocity, the correct combination of which insures the perfect mixture, regardless of engine speed.

The velvet smoothness with which the motor performs, and its unusual ability to deliver the last full measure of power, not only

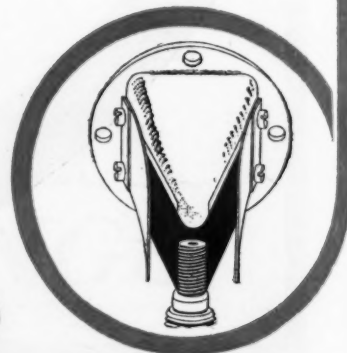
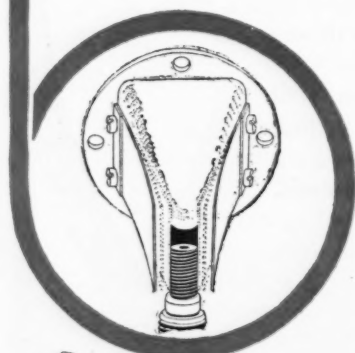
throughout the usual throttle ranges, but also into extreme low engine speeds, demonstrates clearly the constant unchanging uniformity of the perfect mixture secured by the Tillotson carburetor.

By engineers who investigate its merit, the importance of the Tillotson as a perfected carburetor of utmost simplicity is fully recognized.

May we figure on your carburetor requirements?

The Tillotson Manufacturing Company
Toledo, Ohio

Automatic Air Valve



Beauty That Expresses Inherent Strength

The exceptional beauty of Pasco Wire Wheels is a direct consequence of Pasco construction. The features of their design, which give them the appearance of power, grace and distinction, are the same that make them strong, well balanced and convenient.

Take the Pasco hub as an instance. The low, compact, well set effect that Pasco Wire Wheels create is due to this massive, well formed hub which means so much for strength, safety and quick detachability in Pasco construction.

The same parallel can be drawn with other features. With Pascos, as with the majority of well engineered products, beauty and efficiency go together.

Pasco Wire Wheels fit into the assembly of a car, making themselves an integral part of the design and enhancing every effect the designer has aimed to produce. At the same time, they offer a convenience, safety and economy that can be secured in no other way.

This is why Pascos help sell cars.

National Wire Wheel Works, Inc.

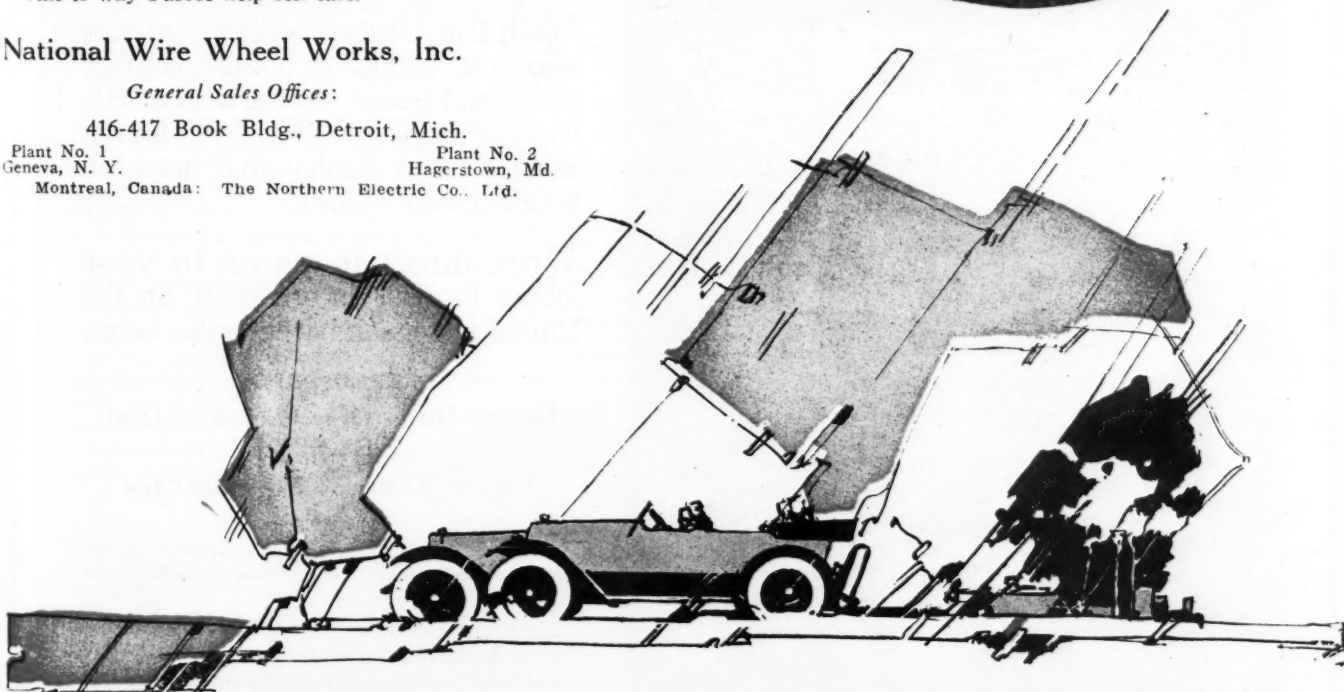
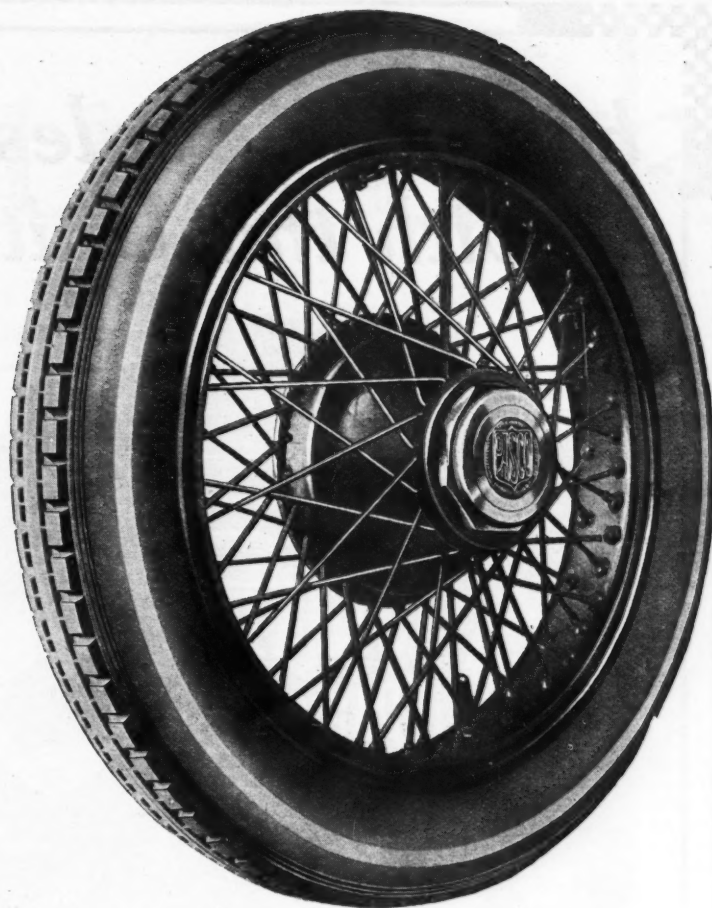
General Sales Offices:

416-417 Book Bldg., Detroit, Mich.

Plant No. 1
Geneva, N. Y.

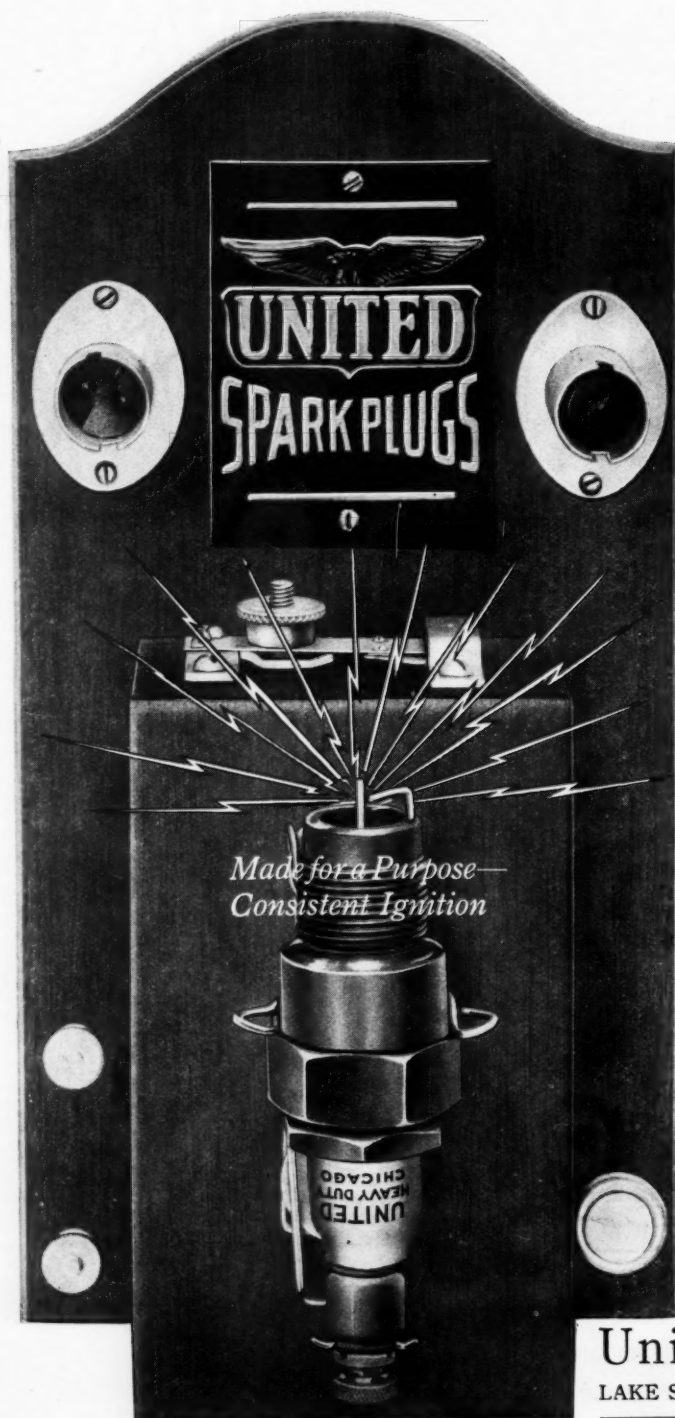
Plant No. 2
Hagerstown, Md.

Montreal, Canada: The Northern Electric Co., Ltd.



PASCO WIRE WHEELS

boost your sales with this United tester



The United tester is a part of the very attractive United display—a quick eye catcher that makes buyers ask for United Spark Plugs.

And when United Spark Plugs are shown, they are sold—because the superior construction and exclusive features of United Spark Plugs are so apparent.

We want you to have this tester so that you can **show** each buyer the fat, hot spark of the United Plug. The United tester is a sure sale maker.

With the United tester you can also test single or double contact lamps and horns, so that with a little flashing device you have an illuminating counter display that helps all your accessory sales.

Write direct to us or to your jobber for full information on the United tester, and other sales helps.

RETAIL PRICE

Heavy Duty (for trucks and tractors)
\$1.00

Junior Type (for Passenger Cars)
75c

Ask Your Jobber for the Plug in the Yellow Checkerboard Box

Look in the Chilton Automobile Directory
and Auto Trade Directory for List of
Jobbers handling United Spark Plugs.

United MANUFACTURING & DISTRIBUTING Company
LAKE SHORE DRIVE AND OHIO STREET, CHICAGO, ILL.

Pacific Coast Representative
A. C. RIDDELL
Marvin Bldg., San Francisco, Cal.
Higgins Bldg., Los Angeles, Cal.

New York Representatives
GRAY-ANDREWS CORPORATION
73 Warren St., New York

Ship by Truck

A Glance at Its Present Performance and Its Future

By Harvey S. Firestone, President, Firestone Tire & Rubber Company

IN previous considerations of Ship by Truck activities the truck express idea has been given prominence. The quick response of business men to this phase of Ship by Truck suggests the presentation here of further data recently secured through the Firestone Ship by Truck Bureau.

For example, Omaha, Nebraska, and Flint, Michigan, have offered a valuable suggestion in the establishment of warehouses or freight stations used in common by the truck express companies entering these cities. This permits convenient handling of through shipments and provides prompt transfers from one truck line to another.

Ship by Truck seems to be offering lower rates to the public than might be supposed. A case in point, is the investigation made of rates out of New York City, disclosing the fact that to many points in the state, in Connecticut, in New Jersey, and Massachusetts, the truck express rates are lower than the railroad rates.

Lower rates may not always be obtainable through Ship by Truck. But the shipper will realize the fact that the extra speed, convenience and adaptability of the truck express systems may be had at the same or little more than prevailing freight rates. And the shipper gains a certainty of delivery, an elimination of goods damaged in transit, a lowering of boxing costs, and a favorable impression on his customers that could be obtained in no other way.

Reports are coming in to the Akron office of the Firestone Ship by Truck Bureau, showing with what enthusiasm business men's organizations and entire communities are aiding the development of truck express lines.

Macon, Georgia, recently arranged a Ship by Truck demonstration day to test the truck express idea. Four truck trains, one train to a route, moved 100 tons of goods to towns within 50 miles of Macon. The demonstration was an education to merchants of the smaller towns as well as to shippers in Macon. A saving in time of from 1 to 10 days was accomplished.



Firestone Ship by Truck Bureaus are now in operation in the following cities:

Akron, Ohio	Milwaukee, Wis.
Albany, N. Y.	Minneapolis, Minn.
Atlanta, Ga.	Minot, N. D.
Baltimore, Md.	Nashville, Tenn.
Birmingham, Ala.	Newark, N. J.
Boston, Mass.	New Orleans, La.
Brooklyn, N. Y.	New York, N. Y.
Buffalo, N. Y.	Oakland, Cal.
Charlotte, N. C.	Oklahoma City, Okla.
Chicago, Ill.	Omaha, Nebr.
Cincinnati, Ohio	Philadelphia, Pa.
Cleveland, Ohio	Phoenix, Ariz.
Columbus, Ohio	Pittsburgh, Pa.
Dallas, Tex.	Portland, Ore.
Davenport, Ia.	Providence, R. I.
Des Moines, Ia.	Richmond, Va.
Detroit, Mich.	Rochester, N. Y.
El Paso, Tex.	Sacramento, Cal.
Erie, Pa.	St. Louis, Mo.
Fargo, N. D.	Salt Lake City, Utah
Grand Rapids, Mich.	San Antonio, Tex.
Great Falls, Mont.	San Francisco, Cal.
Harrisburg, Pa.	Seranton, Pa.
Hartford, Conn.	Seattle, Wash.
Houston, Tex.	Spokane, Wash.
Indianapolis, Ind.	Springfield, Mass.
Jacksonville, Fla.	Syracuse, N. Y.
Kansas City, Mo.	Toledo, Ohio
Los Angeles, Cal.	Washington, D. C.
Louisville, Ky.	Wichita, Kan.
Memphis, Tenn.	Youngstown, Ohio

Call up your Local Bureau for Names of Lines, Rates, Schedules and Other Information Regarding Truck Shipment.

The Chamber of Commerce of York, Pennsylvania, seems to have an unusual record in spreading the knowledge of truck lines, routes and schedules among local business men. Among other things, a transportation map has been prepared which shows Ship by Truck routes to the immediate towns surrounding York, and also to Pittsburgh on the west, as far north as Buffalo, eastward to Philadelphia and New York, and a route south to Baltimore and Washington.

Detroit has proved that refrigerator trucks will move fresh meat to Toledo in about 6 hours as compared with 2½ days by rail. A Chicago packer ships to branch houses by a 12-ton semi-trailer.

A large ice cream company of Cleveland has reduced transportation costs directly by operating trucks to Limaville—a distance of fifty miles—delivering ice cream and ice to their dealers on their down trip and bringing in cream on the return trip. Former delays and wastage were eliminated through this practical application of motor trucking.

The activities of Detroit in fostering truck transportation for the benefit of local shippers recently took the form of a parade so extensive as to require two hours to pass a given point.

Even a cursory study of the growth of the truck express systems inclines one to agree with that official in charge of engineering and maintenance for the U. S. Railroad Administration, who said recently:

"Where, heretofore, development of the country for 50 miles either side of a trunk line of railroad has required the construction of light branch lines, it is a question to be seriously considered whether this policy should be continued or whether good roads should be constructed and the products of farms and passenger travel should not be handled by motor trucks to the main lines. *** Investigation of this subject may show the desirability of the taking up of many branch line railroads and utilizing the abandoned roadbeds for improved motor road."

If you are a shipper you may well ask yourself: "Am I profiting by what Ship by Truck has to offer?" If the question interests you let us suggest that you consult with the local Firestone Ship by Truck Bureau, the Central Firestone Ship by Truck Bureau in Akron, Ohio, or your local Chamber of Commerce.



A practical, money-making example of the Ship by Truck movement:

"Horse Sense"



Study the Traffic's specifications, and consider the price, then you'll have the reason why the Traffic is giving satisfaction and making money for owners and dealers.



The sun never sets on the Traffic—they are in operation in all corners of the earth.



There are over 80,000 motor trucks in use today on farms, with sales in sight this year for nearly 300,000 more. Under the present speed of progress the farmers alone offer a market right now for 1,500,000 additional trucks. It is estimated that 3,000,000 users of trucks conservatively represents the total market in the field of agriculture.



The Traffic is the lowest priced 4,000-lb. capacity truck in the world. Built of standardized units.



Traffic Specifications

Red Seal Continental 3 3/4 x 5 motor; **Covert transmission**; multiple disc clutch; **Bosch magneto**; 4-piece cast shell, cellular type radiator; drop forged front axle with **Timken** roller bearings; **Russel rear axle**, internal gear, roller bearings; semi-elliptic front and rear springs; 6-inch U-channel frame; **Standard Fisk tires**, 34 x 3 1/2 front, 34 x 5 rear; 133-inch wheelbase; 122-inch length of frame behind driver's seat; oil cup lubricating system; chassis painted, striped and varnished; driver's lazy-back seat and cushion regular equipment. **Pneumatic cord tire equipment** at extra cost.

Chassis \$1395
f. o. b. St. Louis



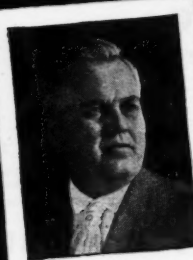
Notice to Dealers

It is Traffic policy to make direct connections in every city, town and village throughout the United States. Wire for territory you want and if open come to the factory and see the Traffic produced and perform.



The Traffic is produced by the largest exclusive builders of 4,000-lb. capacity trucks in the world.

Two men who put their trust in the



T. J. Hoxsey



H. D. Shrout

H OXSEY & S HROUT MOTOR CO.

Traffic Truck

4,000 LBS. CAPACITY

PHONE 39

MEXICO. MO. 7/16/19

Traffic Motor Truck Corporation,
St. Louis, Mo.

Gentlemen,

The wonderful success that we are meeting with in the sale of the Traffic in this vicinity has made us realize that the Traffic franchise is very much more profitable than any of the accounts which we have or have previously had either in the truck or in the passenger car field.

We have delivered eighteen Traffic Trucks in this neighborhood in the past thirty days, and of the six driven away from your plant to-day, three have already been sold.

Our success is all the more gratifying because the Traffic was selected only after we had investigated a dozen other trucks, and now that our convictions have been confirmed, we feel somewhat like a fellow who picks a winner at the horse race.

The exceptional service that the Traffic is giving in the hands of owners, together with the fact that the units used in the Traffic construction are so well known as being of the highest quality, has reduced our sales resistance to a negligible quantity.

Depend on us to "Keep the Traffic Moving" over here.

Yours very truly,

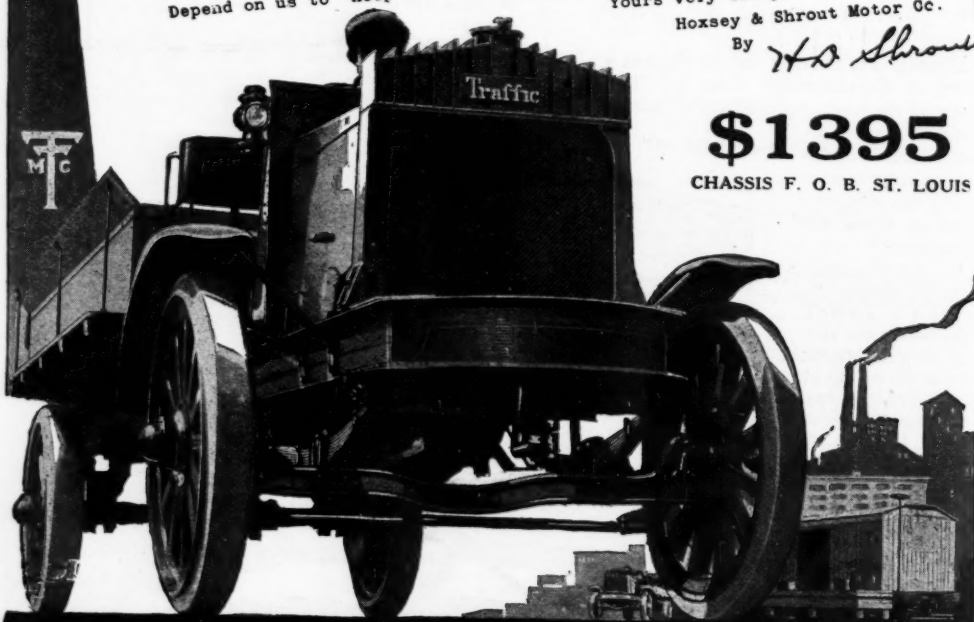
Hoxsey & Shrout Motor Co.

By

H. D. Shrout

\$1395

CHASSIS F. O. B. ST. LOUIS



Traffic Motor Truck Corporation, St. Louis, U. S. A.

The Largest Exclusive Builders of 4,000-lb. Capacity Trucks in the World.

MILES of SMILES

IN three words that's what possession of the AMERICAN Balanced Six means to you.

Miles and miles of smooth going over good roads and bad alike. Countenances always alight with the smile of pure enjoyment that goes with perfect motoring.

- the Smile of Contentment
- the Smile of Proud Ownership
- the Smile of Health
- the Smile of Happiness

Miss Marilynn Miller
of the "Follies"—



—and her lovely smile
behind the wheel of
the American.

Every mile you cover in the AMERICAN is a mile of added joy. Over its *balanced* chassis you ride with such ease. Rough roads have no terrors for you. Sharp turns do not affright you. Your car holds the road at all speeds. No slip—no sidesway going around corners.

And, on the straight road you just *smile the miles away!*

This motoring ease and comfort which is the outstanding characteristic of the AMERICAN is the inevitable product of its balanced construction.

By a scientific distribution of weight the load is divided over each of the four wheels *almost to a fraction of a pound*. The chassis is not underweighted at the rear nor overweighted at the front. Each wheel carries an equal share of the burden—with an effect on the riding qualities of this Balanced Six that is little short of amazing.

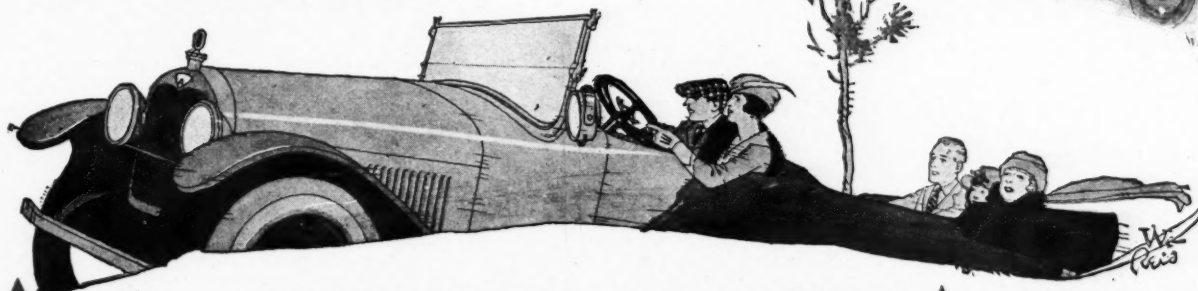
This is the secret and the explanation of AMERICAN success.

It is this fact that makes this marvelously Balanced Six known, wherever it goes, as the Smile Car.

TOURING CARS ROADSTERS SEDANS
45 HORSEPOWER 122-INCH WHEELBASE

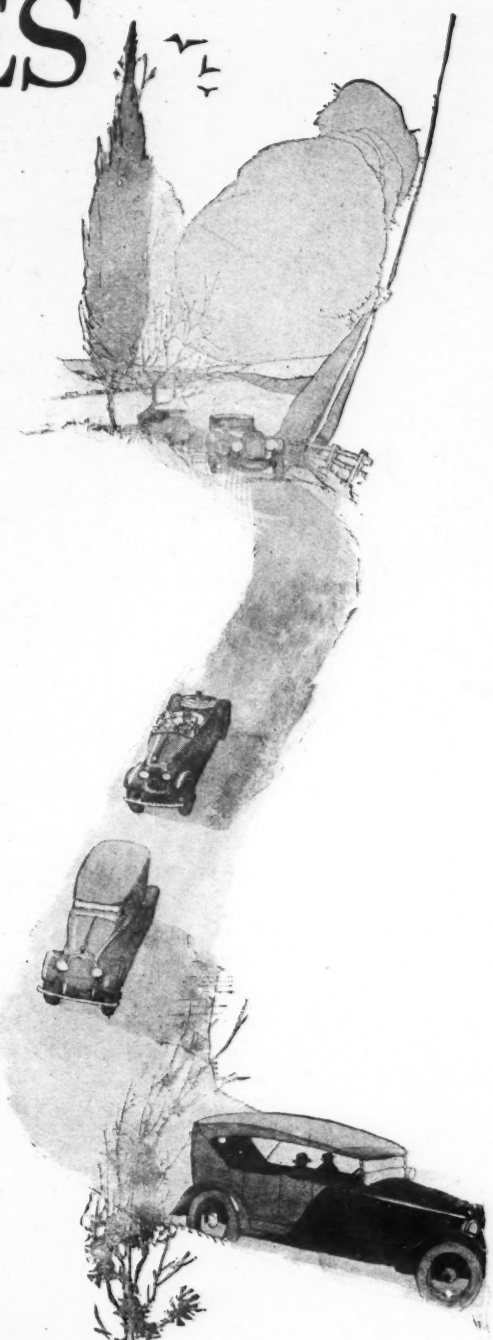
AMERICAN MOTORS CORPORATION

FACTORY: PLAINFIELD, NEW JERSEY

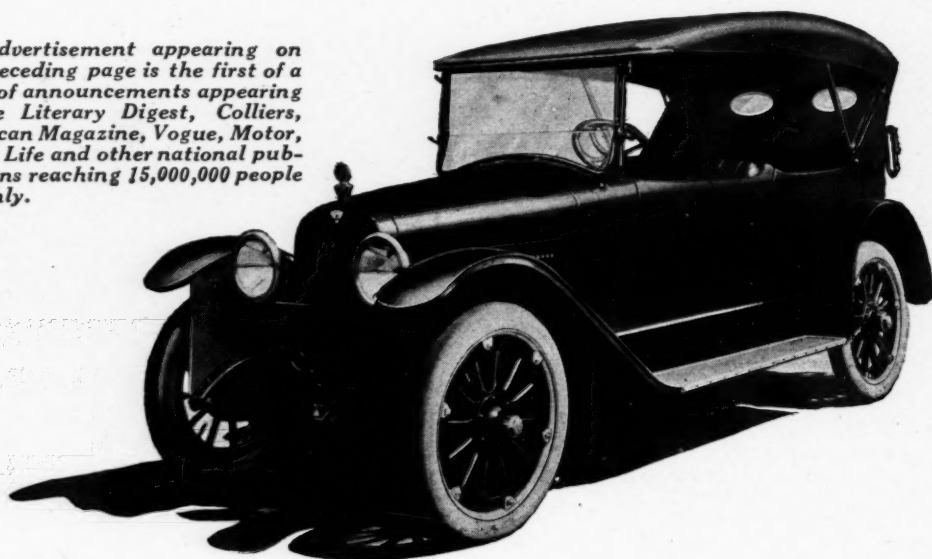


AMERICAN

The Balanced Six



The advertisement appearing on the preceding page is the first of a series of announcements appearing in the Literary Digest, Colliers, American Magazine, Vogue, Motor, Motor Life and other national publications reaching 15,000,000 people monthly.



A COVETED FRANCHISE

THERE are so few cars with features of vital significance that the real innovation embodied in the AMERICAN Balanced Six spells "opportunity" to every progressive dealer.

In keeping with the soundness of its design and construction, the success of this BALANCED Six has been phenomenal.

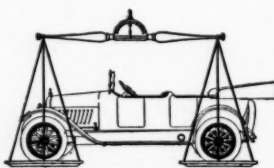
Wherever this master car is offered, its dealers invariably share the benefits of a spontaneous popular endorsement unparalleled in motor car distribution.

Such widespread approval can be explained only by the fact that in this car of superlative excellence the principle of BALANCE is applied for the first time to a light-weight chassis.

Almost revolutionary in its aggregate effect on performance and durability, the incorporation of this principle in the

AMERICAN Balanced SIX has stamped the latter with a degree of approval that is practically unanimous.

In effect it is reflected in this unique car by an amazing roadability that is fast winning for it a national reputation as "The Smile Car."



You, as a dealer, are interested in those qualities in a car that would appeal to you as a buyer, PLUS a sound opportunity to realize materially on your investment of money and effort. Liberality and whole-hearted co-operation are the chief characteristics of our franchise. The demand is great and increasing. Some territory is still unallotted. Write us for particulars.

TOURING CARS
45 HORSEPOWER

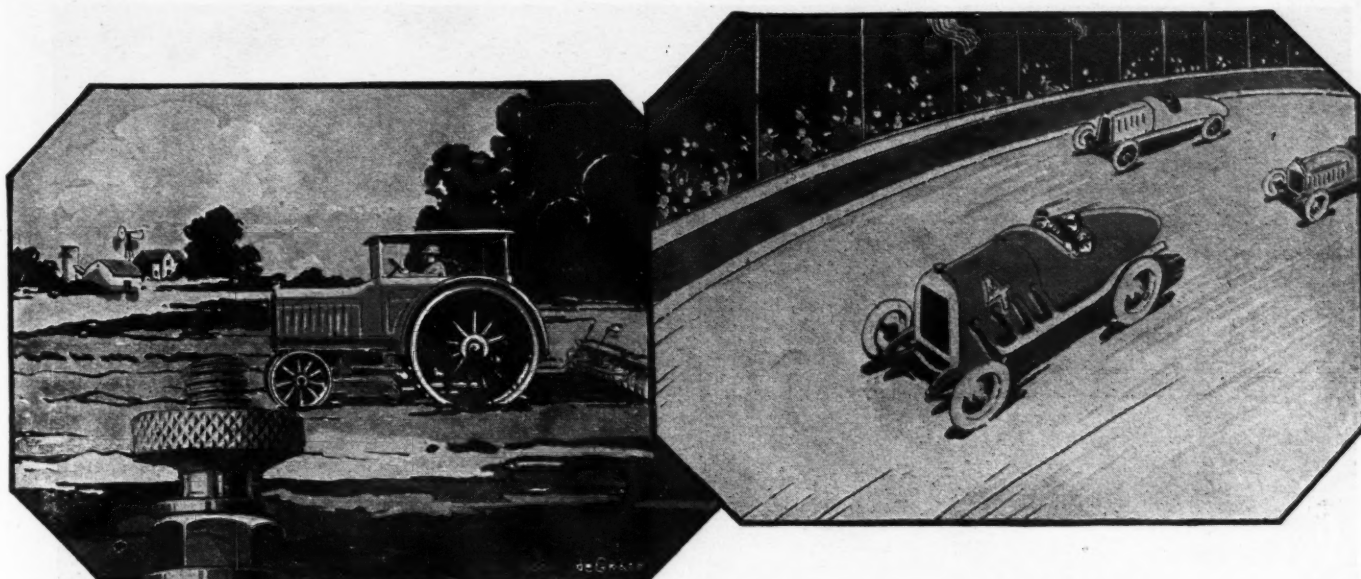
ROADSTERS SEDANS
122-INCH WHEELBASE

AMERICAN MOTORS CORPORATION
FACTORY AND SALES OFFICES PLAINFIELD, NEW JERSEY

AMERICAN

The Balanced Six

M I L E S O F S M I L E S



Of the two, the tractor plugs have the harder job

A TRACTOR motor works ten hours a day—thirty days at a stretch—at full capacity—with little or no attention.

The racing car after elaborate “tuning up” performs a flash stunt.

Of the two, the tractor spark plugs have the harder job. There’s no comparison.

That’s why ordinary automobile plugs *don’t stand up in tractor motors.*

That’s why we have built a line of special Bethlehem tractor plugs—plugs built upon suggestions from tractor

engineers—plugs tested in *tractors*—plugs *successfully performing* today in *tractors* in all parts of the country.

And that’s why dealers are *making money* on the Bethlehem tractor line. They have no real competition. For there is no other real *tractor plug.*

The fellow who is selling automobile plugs to the tractor owner today is digging his own grave.

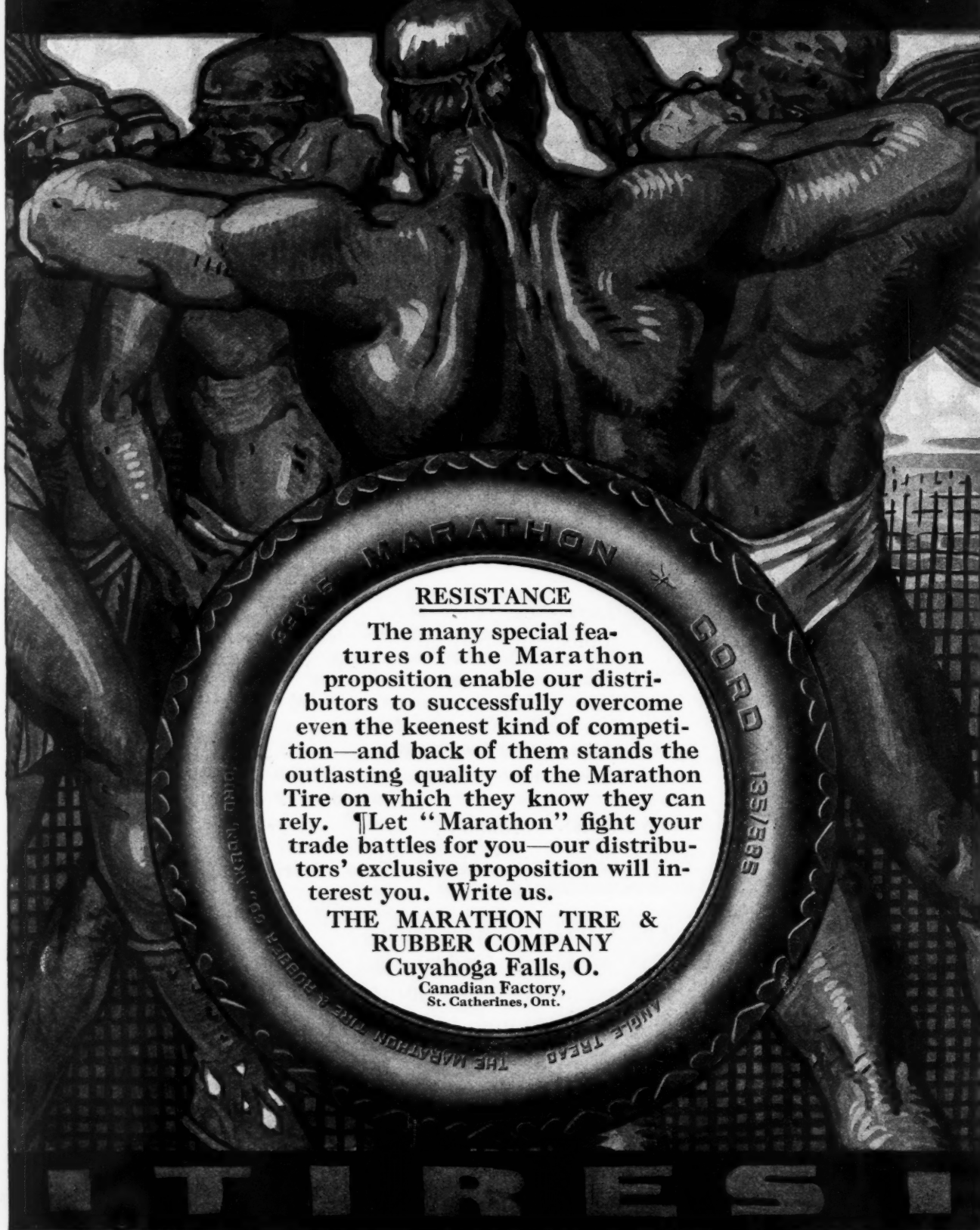
Write for samples and selling plans.

The Silvex Company
BETHLEHEM PRODUCTS
 E. H. SCHWAB, President
 Bethlehem, Penna., U. S. A.

¾ inch long mica tractor plug. Used as standard equipment on International Harvester Tractor and others.

Bethlehem **SPARK PLUGS**

MARATHON



RESISTANCE

The many special features of the Marathon proposition enable our distributors to successfully overcome even the keenest kind of competition—and back of them stands the outlasting quality of the Marathon Tire on which they know they can rely. ¶Let "Marathon" fight your trade battles for you—our distributors' exclusive proposition will interest you. Write us.

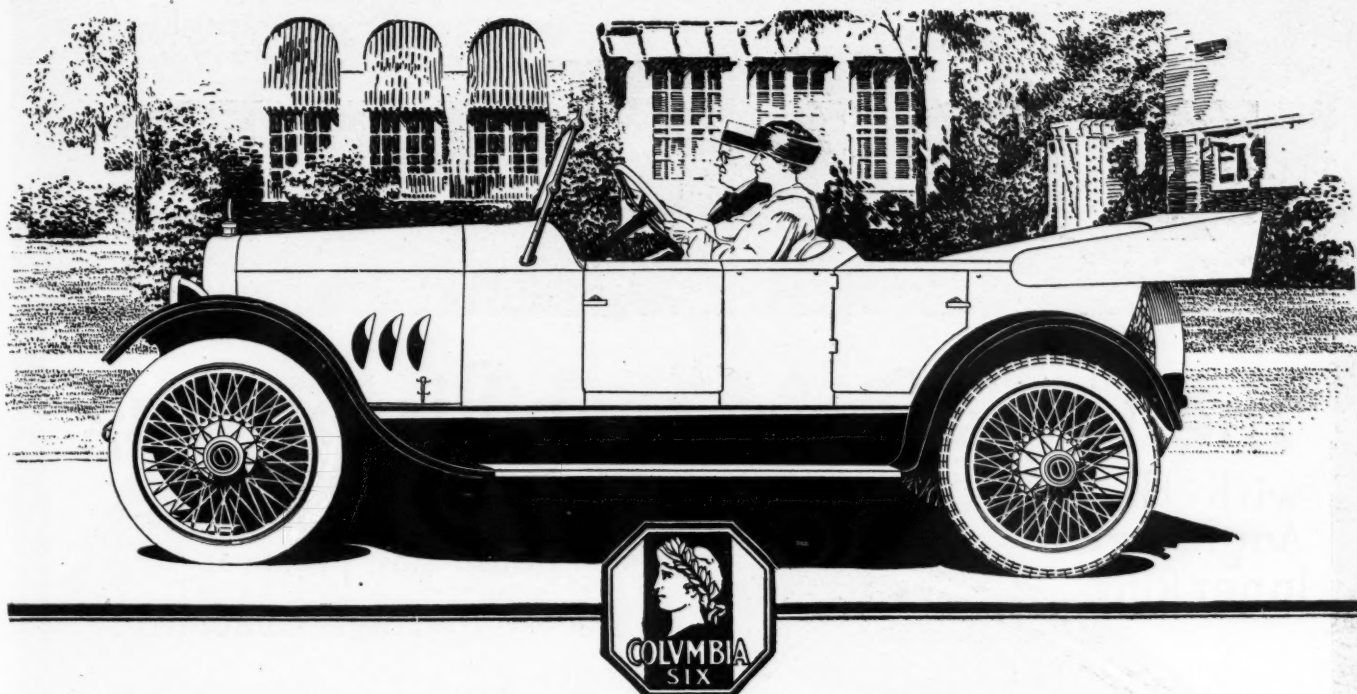
THE MARATHON TIRE & RUBBER COMPANY
Cuyahoga Falls, O.
Canadian Factory,
St. Catharines, Ont.

32X6 MARATHON CORD 135/59S

THE MARATHON TIRE & RUBBER COMPANY

ANGLE TREAD

TIRE



A Woman's Reason

Women also, like the Columbia Six.

They like it because it is really a handsome car—beautiful in lines, finish and in those niceties of equipment and furnishings which mean so much to the feminine mind.

They enjoy having their car admired—enjoy the ease with which it is handled and the supreme riding comfort accomplished by

the non-synchronizing spring suspension.

Because women, in so many cases, have the final word in the purchase of a car—Columbia dealers find the warm friendship between women and the Columbia Six a big sales asset.

The Columbia Motors Company is always glad to talk to capable dealers.

Well Known Units All the Way Through

Timken Axles—Continental Red Seal Motor—Detroit Pressed Steel Company Frame—Radiator with "Sylphon" Thermostatically Controlled Shutters—Spicer Universal Joints—Borg & Beck Clutch—Durstons Transmission—Detroit Steel Products Company's Springs—Gemmer Steering Gear—Auto Lite Starting & Lighting—Atwater-Kent Ignition—Stromberg Carburetor—Prest-O-Lite Storage Battery—Painting and Trimming by The American Auto Trimming Co.—Pantasote Top—Firestone Tires.

COLUMBIA MOTORS CO.

DETROIT, U. S. A.

Columbia Six

TRIÖNE

The Three-Piece Snap Piston Ring

with the
Angle Beam
Inner Ring



The Inner Ring

The inner ring of the Trione ring is built on the same principle as the supporting beam in heavy structural and bridge work. It alone would be of sufficient strength to act as a complete piston ring.

*Many of the best jobbers are
stocking Trione Piston Rings.*

SALES DEPARTMENT

BAILEY-DRAKE CO., Inc.

1120 South Michigan Ave.

CHICAGO, ILLINOIS

BRANCHES:

New York	-	N. Y.
Detroit	-	Mich.
Dallas	-	Texas
Atlanta	-	Ga.
San Francisco	-	Cal.
Kansas City	-	Mo.
Minneapolis	-	Minn.
Seattle	-	Wash.

The Trione makes the three-piece piston ring practical.

Three snap rings combined in one.

As easy to install as any snap ring.

As strong as any snap ring, because all the angles are right angles.

Triply effective, because the gap is sealed and three-point expansion insures true circular expansion.



BAILEY-DRAKE CO., Inc.
1120 South Michigan Ave. Chicago, Ill.
Gentlemen:—Send full information and prices on
Trione Piston Rings. Also a copy of your booklet.

Name

Street

Town

State

MA-9-189

Date



DREADNAUGHT T I R E S



THE DREADNAUGHT TIRE & RUBBER CO
BALTIMORE, MD.

GUARANTEED 6000 MILES

CHARLES F.U. KELLY, INC.
SALES DEPARTMENT
1834 BROADWAY
NEW YORK

TO the man in the street an automobile tire is mostly hole—inside and out. He doesn't know much about how it is made. But you can take the estimate placed upon Kelly-Springfield Cords by thousands of the most experienced motorists as a correct measure of their value.





Jack your car on ball bearings

A FEW easy turns on the long handle and your car is raised. To lower it, merely reverse the turns and pull the jack out by the handle. You perform every operation without once getting under the car.

The diamond point hardened steel top with BULL-DOG grip bites the axle and holds it firm. There is no danger of slipping. You can avoid having the tire rim fall on a deflated tire.

Kimball Jacks sell fast because every time you use this jack you give a demonstration. Motorists everywhere want the Kimball because it is reliable and easy to use. Stock it and sell more jacks.

PRICES			
Size	Medium Height	Extended Height	Price
No. 1	9 in.	15 in.	\$7.00
No. 3	11 in.	18 in.	7.00
No. 4	12 in.	20 in.	7.00

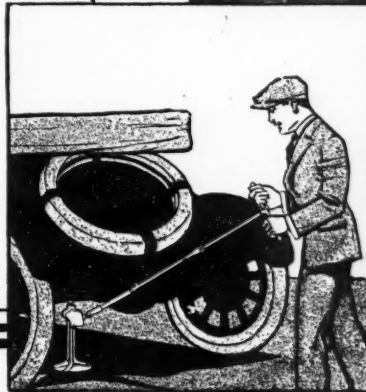
Kimball Special Truck Jack that easily raises any style truck sells for \$15.00.

SALES DEPARTMENT

EDWARD A. CASSIDY COMPANY, Inc.

Madison Avenue at 40th Street, New York

Manufacturers: F. W. MANN COMPANY Milford, Mass.



Every operation of raising and lowering without even stooping. You can avoid dirt and grease. Eliminate all chance of ruining clothing and injuring hands.

KIMBALL AUTO BALL BEARING JACK

ANDERSON 6

Irresistible Appeal

Who has not longed for a thoroughbred roadster of racy lines expressive of power, speed and smooth flight?

And then awakened to the fact that his needs call for a touring car—frequently must carry extra passengers?

For him the Anderson holds irresistible appeal. The patented Anderson Convertible Roadster can be transformed instantly from a racy two-passenger to a commodious five-passenger car.

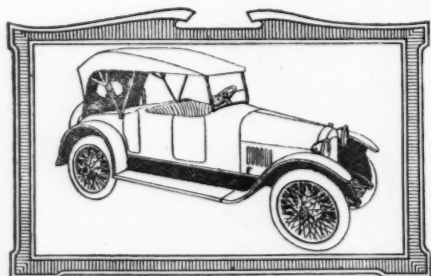
The Convertible Roadster is but one of the Anderson models. On the same dependable chassis are also built the four and seven-passenger cars, the four-passenger sport model and the Convertible Sedan.

The new 7-R continental motor incorporated in the Anderson 6 is the culminating achievement in motor construction.

Thirty-three years of quality vehicle manufacture stand in back of the Anderson—the embodiment of foremost mechanical units insures complete motoring satisfaction.

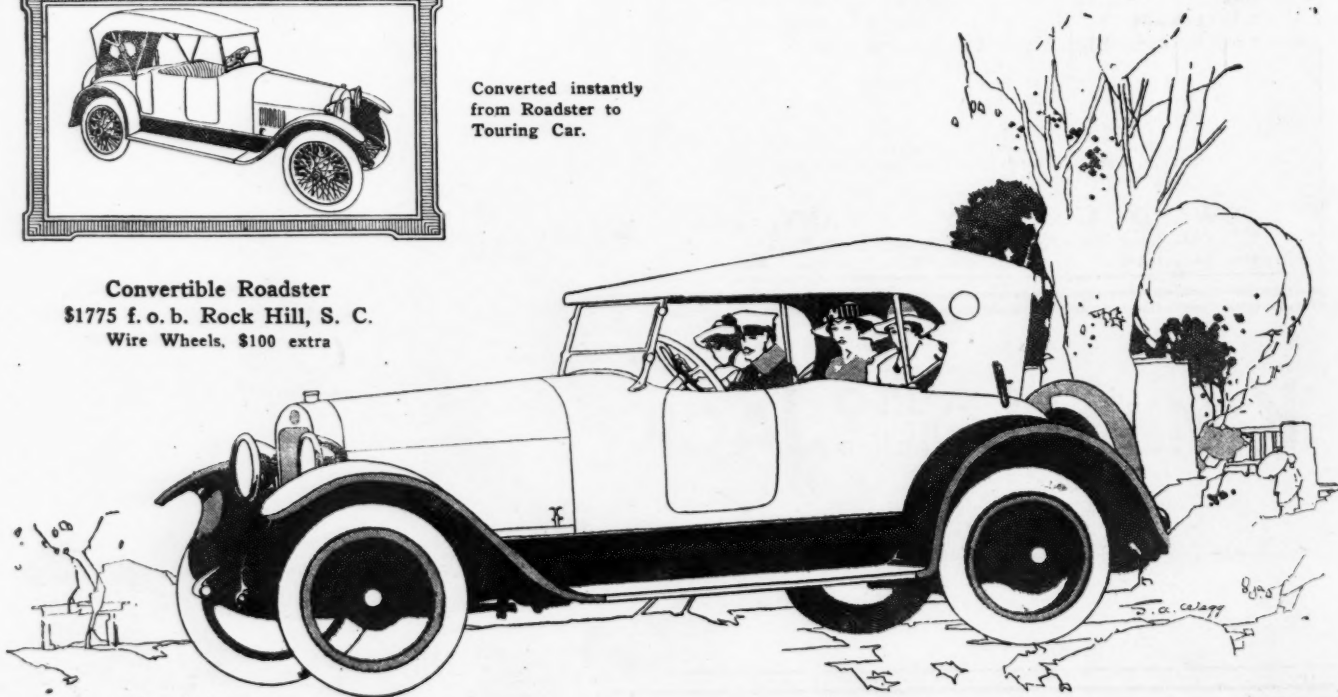
There are a few dealerships open to responsible car merchants.

ANDERSON MOTOR COMPANY *Rock Hill, South Carolina*



Converted instantly
from Roadster to
Touring Car.

Convertible Roadster
\$1775 f. o. b. Rock Hill, S. C.
Wire Wheels, \$100 extra



The Specially Built Extrasize Tire

for Fords, Chevrolets,
Maxwells and others
with 30 x 3½ rims



You know the advantages of over-size tires—here's the tire you have always wanted at a price you are willing to pay.

The "Jumbo" costs but little more than a 30x3½ and considerably less than a 31x4. It is the largest and most flexible tire for 30x3½ rims—it has an added resiliency obtained only because we have produced in this tire a carcass of extra strength without extra thickness.

The "Jumbo" is the specially built over-size in a field that covers 50% of the automobiles in use.

Built in Akron, Ohio, by

The General Tire and Rubber Co.
The fastest-growing line in the fastest-growing industry



Proportion of a "Jumbo" to a 30x3½. We guarantee that none but 17¼-ounce Sea Island Fabric is used in building The General "Jumbo" Tire.



"CATERPILLAR"
REG. U.S. PAT. OFF.

Farmers are Asking about



"CATERPILLAR" **TRACTORS** REG. U.S. PAT. OFF.

Farmer demand is swinging around to tractors dependable in performance and with plenty of power.

More of them than you realize are now interested in tractors that will do the work that present equipment can not do.

This growing demand for better tractors is wide spread. Farmers in every section of the country are asking us for information about the "Caterpillar", because they have learned to measure the value of a tractor by the service it gives, and they know the "Caterpillar" always does its work.

There is profitable business for the dealer who sells a tractor of proven dependability, power and stamina. One dealer whose business will be permanent and profitable, is the "Caterpillar" dealer.

Those who are in a position to handle the "Caterpillar" agency are invited to ask for further information. *Write—*

The HOLT Manufacturing Co., Inc.
There is but one **"CATERPILLAR"**—HOLT builds it.

Peoria, Illinois

Factories: Peoria, Ill. and Stockton, Cal.

Branches and Distributors:

Atlanta, Ga.
Fargo, N. D.
Kansas City, Mo.
Los Angeles, Cal.

Memphis, Tenn.
New York, N. Y.
Omaha, Nebr.
San Francisco, Cal.

Spokane, Wash.
Wichita, Kans.
Calgary, Alberta
London, E. C.

A Gasket Paper Made For Every Use

Except in Contact With Extreme Heat

For which purpose we recommend
TENAX Asbestos Sheet Packing



Adpasco Treated Gasket Paper

A Specially Treated Paper
That Every Shop Needs Right Now

ADPASCO Treated Gasket Paper—efficient—most economical—dependable—handy and pleasing to use—because its firm flexibility gives full assurance that it will take care of its job properly. It cuts up easily with no waste and holds its shape even after a water or oil soaking. Stands up indefinitely and is permanent in the hands of a good mechanic.

Reasonable in Price

The superiority of ADPASCO Treated Gasket Paper may lead you to believe it much higher in price than the ordinary kind—but the reverse is the case. It sells at the Price of other papers which lack its every good feature. Place your order today—your men will be quick to appreciate how much of a help and economy ADPASCO Treated Gasket Paper will be to you.

Supplies a Need—Means a Saving

Many times your mechanics need a gasket or a sheet that merely is to be waterproof. Sometimes they use a makeshift oil paper or even wrapping paper, but more often they use some of your high grade asbestos packing.

ADPASCO Treated Gasket Paper is made to fill that gap—to save money for you and to help your mechanics in their work.

One jobber salesman sold a full case of 125 sheets to a shop as soon as he showed it and quoted the low price.

Write for Samples and Prices

Ask your jobber for details but if he cannot supply you NOW send us his name, using the coupon. At the same time, let us mail you direct, at our expense, samples and prices on ADPASCO Treated Gasket Paper. Sheets are 36 in. by 40 in. Weight approximately 12 oz. per sheet. Send blue prints or templates if you wish figures on special gaskets. Fill out the coupon and mail it to us today. Tear it out NOW!

JOBBER: If you haven't already arranged to handle ADPASCO Treated Gasket Paper for your trade, write us NOW! Help them enjoy the saving and convenience of this much needed sheet.

Advance Packing & Supply Co.,

13-15 N. Franklin St., Chicago

Allied Industries, Inc.,

Pacific Coast Repr., 283 Minna St., San Francisco, Calif.,
240 Azusa St., Los Angeles, Calif.,
1252 First Avenue, South, Seattle, Wash.

**Advance
Packing &
Supply Co.,**
13-15 N. Franklin St.
Chicago, Illinois

Gentlemen:

Please send us prices, samples
and description of ADPASCO
Treated Gasket Paper.

Name

Address

City

Am rated as a dealer..... Jobber.....

My jobber is

Address

(Please fill this in)

BENFORD'S GOLDEN GIANT

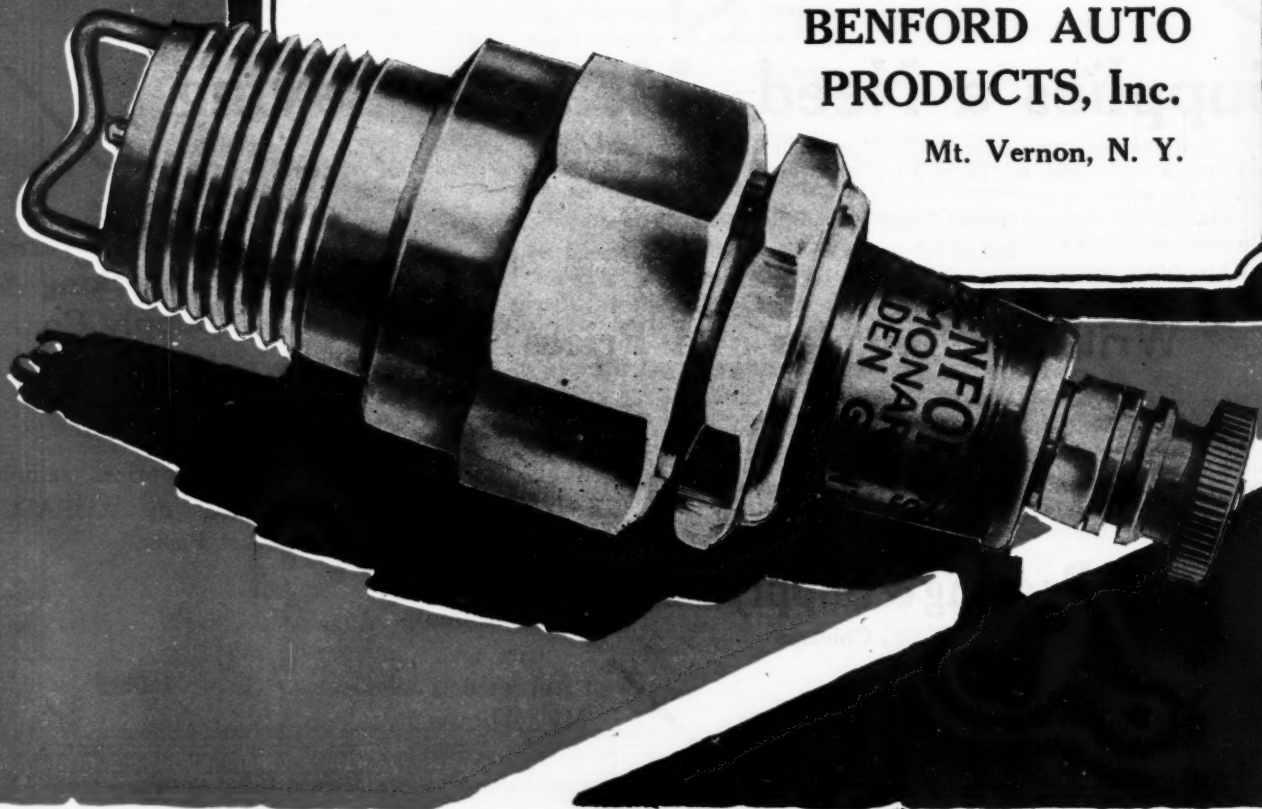
The Indestructible Blue Adamant Insulator
The Pure Nickel Electrodes
The Perfect Workmanship

The Distinguished Appearance
Gold Plated to Mark Its Excellence
Retails for \$1.00—and worth more

“Join the Good Company that Golden Giants Keep”

BENFORD AUTO
PRODUCTS, Inc.

Mt. Vernon, N. Y.





Here's the "ZIP" Display Case

Place it in the window, inside, or on top of the show case. It's a neat, attractive little salesman that tells its own story. Fifty pieces of illustrated literature packed in each case, showing exactly how the "ZIP" patch is applied.

CASES ARE PACKED AS FOLLOWS

1½ Dozen of the 50-cent size (25 sq. in.)	Assorted	Six 50-cent packages.
1 Dozen of the \$1.00 size (54 sq. in.)		Five \$1.00 packages.
8 only of the \$1.75 size (144 sq. in.)		Two \$1.75 packages.

SOLD IN ROLLS FOR GARAGES, TIRE REPAIR HOUSES, ETC.

DON'T FORGET THAT "ZIP" IS THE REAL TUBE PATCH
NO CEMENT NO HEAT NO SKILL

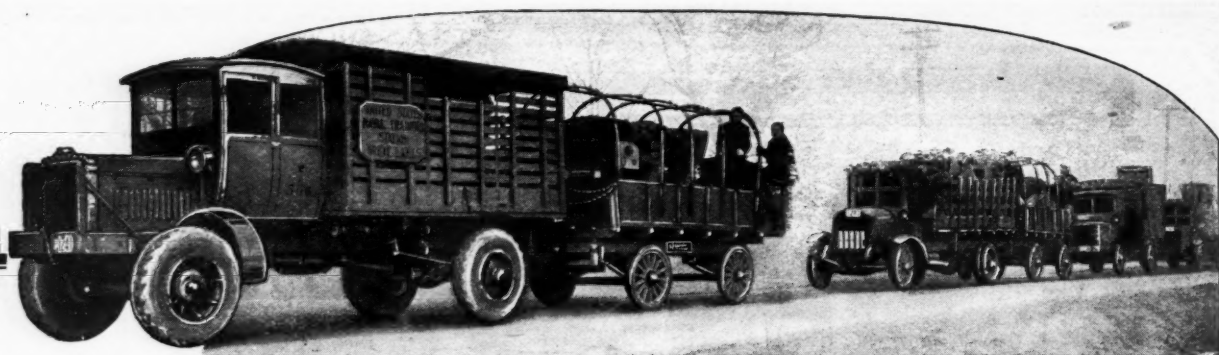
Write for prices and particulars

BAKER AND LOCKWOOD MFG. CO.

BROOKLYN, 473 Kent Ave.

KANSAS CITY, MO.
Established 1870

CHICAGO, 3021 Michigan Ave.



Fleet of 27 Highway Trailers in Service at the Great Lakes Naval Training Station

Note the Price Advantage of Highway Trailers

Standard Model Exclusively Accepted Without Modification by U. S. Army and Navy

Undersell Average Trailers \$250 to \$400

Now is your opportunity to secure a Highway Trailer franchise, while some of the choice territories are still open.

Everywhere you see the remarkable growth of their use. Hundreds of truck operators have added Highway Trailers as a result of the U. S. Army and Navy's demonstration of their usefulness. In the operation of more than \$1,000,000 worth they proved that Highway Trailers cut haulage

costs in excess of rated truck capacity by 80% to 90%.

More than 180 lines of business now operate them. They include dairies, lumber yards, contractors and builders, merchants, wholesalers, manufacturers, coal dealers, road engineers, telephone companies and transportation companies.

Highway Trailers have many exclusive advantages that make them the choice of truck operators. Write for details.

Four Wheel High Speed Heavy Duty Reversible Type Trailers

1 1/2 TON Capacity	2 1/2 TON Capacity	4 TON Capacity	6 TON Capacity
\$575	\$785	\$1075	\$1395

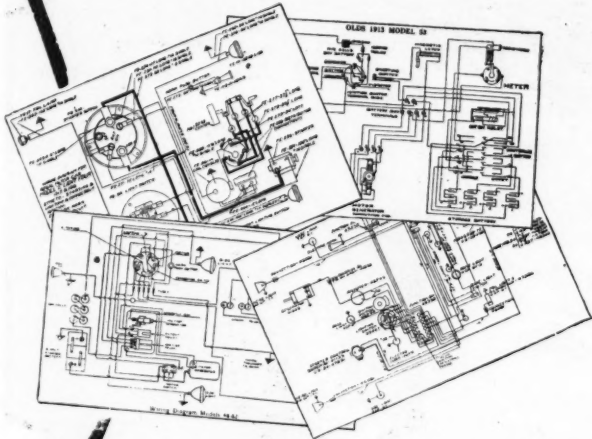
HIGHWAY TRAILER
EDGERTON
WISCONSIN

850 WIRING DIAGRAMS

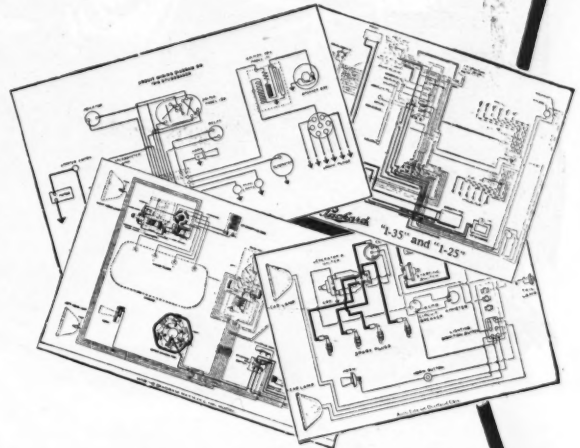
In New Edition of

The Auto Electrician's Guide

Contains wiring diagrams for every car on the market, including the new 1919 Starting and Lighting Systems for Ford cars, also diagrams for Baker R & L and Detroit Electrics and pipe connections for Stanley Steamers. Covers all kinds of systems from 1912 to 1919 and many as far back as 1906. Most complete diagram book on the market.



They
Make
Wiring
Problems
Easy



Highly Endorsed by Auto Manufacturers, Garages and Service Stations

No problem too puzzling if you have the Auto Electrician's Guide. ANY "OLD STICKER" QUICKLY SOLVED with the help of this book. Saves hours of time on both old and new jobs. Impossible for even experts to know all cars but no car will "stick" you when you have this book. A practical, easily understood "guide" that will simplify all auto-electric

problems and make it possible for you to quickly overcome hundreds of starting, lighting and ignition troubles which otherwise would take hours to solve. Extensively used all over the country. Hundreds of auto experts and repairmen depend on it to solve hardest problems. Dozens of letters received telling of its exceptional value. Read the following:

DODGE BROTHERS

MAKERS OF MOTOR VEHICLES

DETROIT, U.S.A.

"Gentlemen: I am in receipt of your book, 'The Auto Electrician's Guide,' for which please accept my thanks. We find this a very complete and valuable book and one that I have been exceedingly anxious to get hold of for some time. I not only find this book complete in every detail, but simple and easily understood. It is a book every dealer or garage owner should have."

(Signed) H. M. Wiegand,
Final Inspection Dept.

Westinghouse Electric & Manufacturing Company
SERVICE DEPARTMENT



EAST LIBERTY P. O. STATION, PITTSBURGH, PA.

"Dear Sir: Referring to your letter of October 18th, with reference to 'Auto Electrician's Guide,' I am very glad to advise that the 'Guide' has come to hand. I find it to be a very valuable handbook, and congratulate you on the arrangement, the completeness of the diagrams and its general usefulness to the automobile trade."

"If you publish any supplements or additional sheets for this Guide, I would be very glad to receive copies of same, and if we can assist you in any way with information pertaining to our apparatus, I would be very glad to do so."

(Signed) Automobile Equipment Service Dept.
W. I. Everett, Supt.

Ward Leonard Electric Company

ELECTRIC CONTROLLING DEVICES

"Dear Sir: I have carefully viewed your 'Auto Electrician's Guide,' and have had our Superintendent go over it also. We are much pleased with it. I think it is indispensable to garage men and to men who are doing active work on different makes of cars. The only criticism I can make is that the indexing might be improved, although after studying it I cannot suggest a method of improvement. You have handled a difficult subject very well indeed."

(Signed) Ward Leonard Electric Co.,
D. J. Burns.

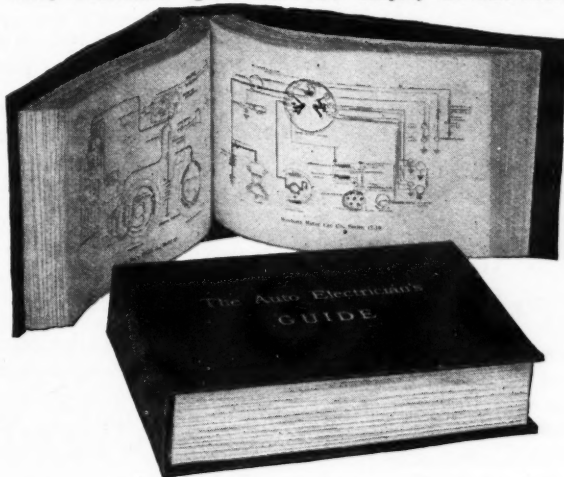
—Easy to handle and easy to add new diagrams as issued. Convenient to slip into the coat or car pocket. Invaluable as a constant companion to repairmen. Scores of trouble cases quickly and easily corrected with the help of this guide.

PRICE \$7.50, PLUS POSTAGE TO YOUR CITY. ORDER DIRECT. SEND TODAY.

Shipping weight 3 lbs. Include postage with remittance. Money refunded if not satisfied.

Remit by Post Office money order or bank draft

Michigan State Auto School
2829 Auto Bldg., 687-91 Woodward Ave., Detroit, Mich.



A LOOSE LEAF BOOK



Draw a glass of water from the pet-cock under your car. You will find it brown with sediment due to constant rusting away of the cooling system walls.

How to Eliminate Rust—One Cause of Cooling System Leaks

MANY a motorist does not realize how the cooling system of his car is rusted until a leak develops somewhere. Or perhaps he finds his engine *overheating*—due to Rust and Scale which choke the water passages.

There is *one* way—developed by chemical research—to avoid all difficulties with Rust and Scale and to prevent leaks. *Keep "X" Liquid in the water of the cooling system.*

"X" Liquid will not only dislodge Rust and Scale already present, but will *prevent* rusting and scaling in the future. Furthermore, if there is a leak in the radiator or elsewhere in the cooling system, "X" repairs it instantly and permanently.

Scientific tests—backed by the *practical experience* of 3,000,000 car owners—demonstrate that "X" Liquid seals all leaks in the cooling system wherever they occur. "X" not only repairs the leak permanently, but, kept in the water, is *constant insurance* against new leaks.

"X" Liquid Repairs All Leaks Permanently!

"X" Liquid is the only *practical* method of repairing leaks **PERMANENTLY** without danger to the cooling system. Poured into the radiator, it combines with the water, circulates freely, locates every leak or crack—whether in the radiator, pump, water jacket, connections, gaskets, etc.—and flows through.

In addition "X" *loosens* the rust and *dissolves* the scale now present—prevents further formation of new

rust or scale. The result is a cooler, *better working engine*—plus a saving of oil and gas.

Not a Radiator Cement!

Don't confuse "X" Liquid with Radiator Cements, flaxseed meals and other "dopes" in solid or liquid forms. These merely choke the leak for a while, clog the water passages and injure the cooling system.

"X" Liquid is used by hundreds of thousands of car owners as the *only safe means* of permanently repairing radiator leaks. Used by the U. S. Government in several departments.

Get "X" Liquid from your dealer—or we will ship direct on receipt of price and dealer's name.

"X" LABORATORIES

25 West 45th St. New York City
Pacific Coast Branch
433 Rialto Building San Francisco, California

"X"
TRADE MARK

Liquid makes all water cooling systems
LEAKPROOF • RUSTPROOF • SCALEPROOF

No More Broken Springs

Many More Pleased Customers

NO more broken springs! To car owners and truck owners this means a positive relief from the danger and costly nuisance of spring accidents.

TO distributors it means many more pleasant customers—profitable customers. Tuthill Titanic Springs—built on the sound and sure arch principle—without holes or nibs to weaken them—supply this long-felt need.

INSTEAD of the hole or nib in the center, Tuthill Titanic Springs are smooth and whole—each leaf arched, so that the hardest jolts and blows meet the greatest resistance at the point they strike the spring hardest.

ISN'T this the kind of service you are pleased to offer your customers? Isn't it easier to sell a motorist a *spring that won't break*, instead of a spring that may break again?

SELL safety and satisfaction when you're asked for springs—sell Tuthill Titanics—and win the trade of your entire community on the basis of merit, service and satisfaction.

TUTHILL Titanic Springs are guaranteed forever against breaks in the center—where nine out of ten springs break. And they're guaranteed for a year against all defects in quality or service.

THERE is a Tuthill Titanic Spring for every make of car and truck. See Chilton's or Auto Trade Directories for complete list of dealers.

The Hell Gate Bridge, one of the newest spans across the river in upper New York City, furnishes the newest proof of the strength of the Arch, as demonstrated in the Tuthill Titanic Spring.



Tuthill Titanic Springs for Ford Cars—Price \$6.00

The
Strength's
in the
Arch

Send for Free Book

that gives you facts about the Tuthill Titanic. Ask for the distribution proposition. Costs nothing—implies no obligation. And it may be the means of a tremendous increase in your business. Write today.

A handsome sign and spring rack FREE for your showroom—under special proposition—write!

TUTHILL SPRING COMPANY

760 Polk Street

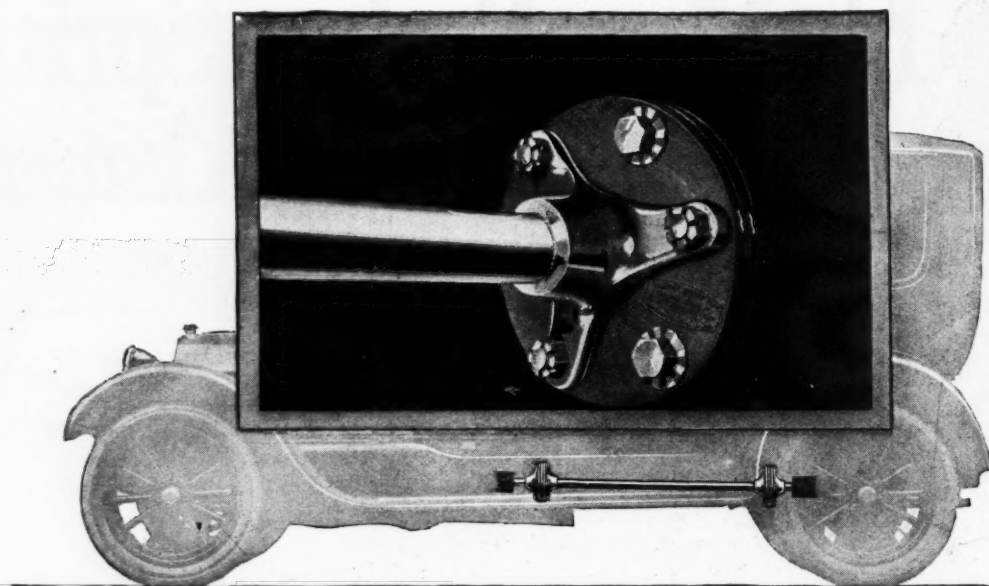
(Established 1880)

Chicago



Strongest where Old-Style Springs are the Weakest

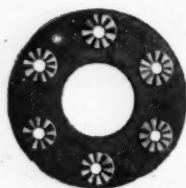
Guaranteed to wear forever



A universal joint that never wears loose



The layers are arranged fanwise, so that the strands of cotton in the various plies run in different directions. This patented construction gives the disc a uniform strength and elasticity which can be obtained by no other method.



The bolt holes are reinforced with fluted steel washers.

THERMOID-HARDY Universal Joints never wear loose. There are no metal-to-metal bearing surfaces, and consequently there is no rattle and no vibration. All the disadvantages of the old-fashioned metal universals are entirely eliminated.

Thermoid-Hardy Universal Joints also act as shock absorbers to the propeller shaft. The elastic discs insure a smooth application of power from the motor to the rear axle, thus reducing wear on the running gear and prolonging the life of the entire car.

Tests for strength and durability

For nearly four years Thermoid-Hardy Universal Joints have stood severe tests on every type of automobile from the lightest passenger car to the heaviest truck. In many cases they have given 60,000 miles of hard service without any attention whatever, the original discs still remaining in good condition.

In one test a powerful racing car was driven for 10,000 miles at an average engine speed of 3200 revolutions per minute without loosening the joints in the slightest degree.

The Thermoid-Hardy process

The patented scientific process by which Thermoid-Hardy Universal Joints are constructed, is the chief reason for their great strength. The discs are built up from layers of the highest quality cotton fabric, impregnated with a special friction compound.

The plies are arranged fanwise in the well-known Thermoid-Hardy formation, so that the strands of cotton in the various layers run in different directions. The disc is then cured under hydraulic pressure until it becomes one compact inseparable mass, with a tensile strength of 3400 pounds per square inch.

Thermoid-Hardy Universal Joints are absolutely silent in operation, and are unaffected by sand, mud, oil or water. They require no protection and no lubrication.

Fifty leading manufacturers of passenger cars and trucks have adopted Thermoid-Hardy Universal Joints as standard equipment.

Send for our new book, "Universal Joints—Their Use and Misuse." It will give you details of construction, records of performance and opinions of leading engineers.

Insist that the car you handle be equipped with Thermoid-Hardy Universal Joints.

Thermoid-Hardy Universal Joints will make good—or WE WILL.

Thermoid Rubber Company

Sole American Manufacturers

Factory and Main Offices: Trenton, N. J.
 New York Chicago San Francisco Detroit
 Los Angeles Philadelphia Pittsburgh
 Boston London Paris Turin

THERMOID-HARDY UNIVERSAL JOINT

Fanwise construction for strength

Makers of "Thermoid Hydraulic Compressed Brake Lining" and "Thermoid Crolide Compound Tires."

National BODIES for Ford Cars

\$285⁰⁰

Just get any Ford owner to drive his car along side of a Ford equipped with a National Body and the National will sell itself every time.

Adding classy design, ease of riding, convenience, utility and appearance to Ford motor efficiency, furnish a combination of beauty and utility equivalent to cars selling at \$2500 or more.

Here is a logical built body—not a novelty—a body which is built for service. This is the body that makes automobile owners out of Ford admirers who demand more than the ordinary Ford today—and offers a selling proposition which is most profitable to any dealer—anywhere.

Full particulars on request
Order a demonstrator TODAY

National Body Mfg. Co.
Nashville, Tenn.



WIRE OR WRITE FOR DEALER'S PROPOSITION

DAILEY MOTOR TRUCK BODIES

Service That Helps You Sell Trucks

A Dailey Agency is an added sales weapon and a source of substantial profit. It enables you to promptly supply the most suitable type of truck body—that will quickly clinch the truck sale.

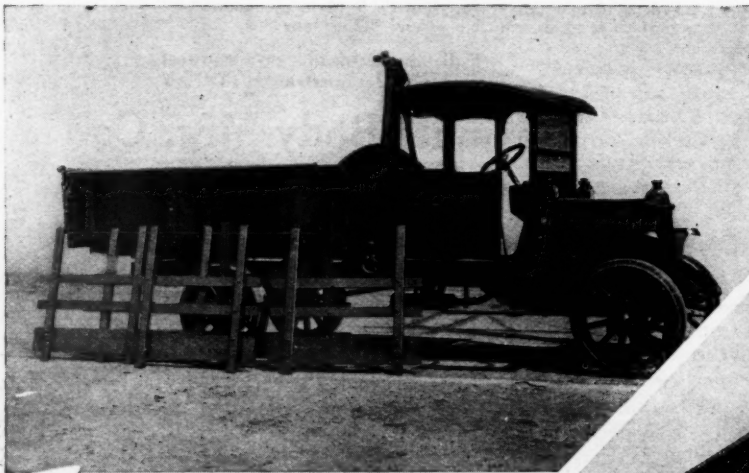
You can secure all types of wood and steel bodies from us, immediately. No costly delays—no time lost hunting around for the proper body.

Our engineers know the haulage problems of every business. They assist dealers in the selection of bodies properly designed.

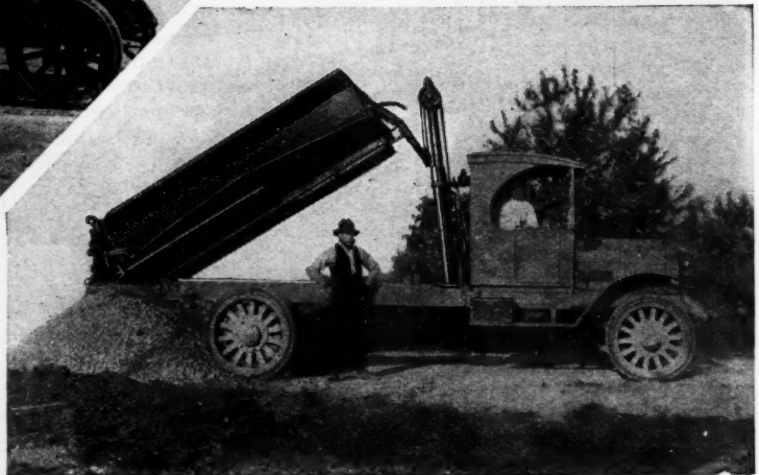
We have always on hand a large stock of Dailey 4-in-1 convertible wood bodies and standard steel bodies. These bodies can be shipped at once or we can build a special body of any design in record breaking time.

Write for booklet on various types of bodies and dealer discount.

H. R. DAILEY, Auto Truck Steel Body Co.
3028 Carroll Avenue CHICAGO



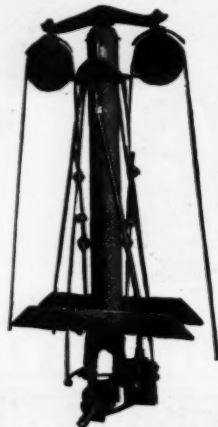
Dailey 4-in-1 Body, with hand hoist. Can be changed from one type to another in 3 minutes without tools.



Standardized special steel bodies—any style—any design—built for long life and severe service. Delivered promptly.



Dailey Hand Hoist, sturdy and efficient. Occupies but 9 in. of space on chassis. For trucks of all capacities.



Hydraulic Hoists — for use with steel bodies and for heavy duty work

STEEL AND WOOD BODY DISTRIBUTORS

Springfield Commercial Body Co., 385 Liberty St., Springfield, Mass.

Springfield Commercial Body Co., Cambridge, Mass.

Auto Truck Steel & Wood Body Co., 1815 N. 23rd St., St. Louis, Mo.

The John Immel & Sons Co., Columbus, Ohio.

Hydraulic Hoist Mfg. Co., 715 Lorraine Ave., Detroit, Mich.

The Truck Engineering Co., 3533 Cedar Avenue, Cleveland, Ohio.

Simplex Mfg. Co., Conneautville, Pa.

Simplex Body Co., 140 Rhode Island St., Buffalo, N. Y.

Auto Hoist & Body Co., 333 Avenue B, New York City, N. Y.

Troy Trailer Co., 5 North 21st Street, Philadelphia, Pa.

Thomas & Company, Brad-dock Avenue, near Forbes Street, Pittsburgh, Pa.

Auto Hoist & Body Company, 18 Bainbridge St., Brooklyn, N. Y.



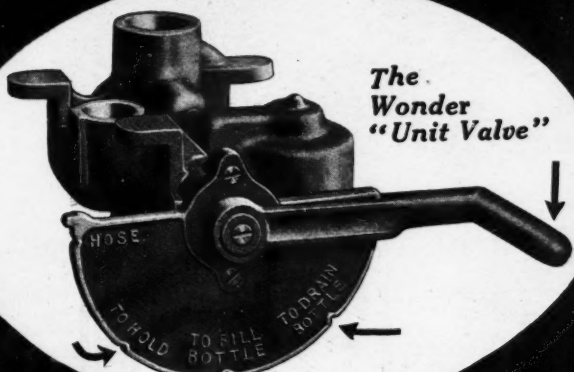
Dealers—Let Them See What They Are Getting —and They Will Come Back for More

Let them see the 5 gallon bottles filled to the brim with pure filtered gasoline, which they know they are going to pay for and *get*.

All that is necessary for the operator to do is to open a cock and the vacuum does the rest. The filling process is automatically stopped when the bottle is full. A small lever permits the gasoline to be held in the bottle or released through the filling hose. The twin bottles give you two stations in one, insuring rapid service that pays.

This visible service system appeals to every car owner. It brings them back for more—which means a large volume of business and big profits.

Send for full particulars explaining the IDECO TODAY.



The
Wonder
"Unit Valve"

The Visible Service System

Springfield

IDECO
Incorporated

Illinois

H&D

SHOCK ABSORBERS

"Single or Twin Arm"

*Send for it
To-day*

H & D COMPANY, Inc.
GOODLAND INDIANA

In Canada
Richards-Wilcox Canadian Co., Ltd.,
London, Ont.

The H. & D. Hand Book

H. & D. Shock Absorbers were not only made to sell—but to SERVE. In order that dealers may be better informed regarding H. & D. construction—H. & D. methods of installation and maintenance—H. & D. Selling Practice—and other valuable matter of interest, the H. & D. Company has prepared an

Instructive Hand Book Now Ready for Distribution

A copy of the H. & D. Hand Book will be forwarded, upon request, to present H. & D. Dealers—and also to those dealers who wish to stock a Nationally known shock absorber, which is unequalled for service on Ford passenger cars and trucks.



U. S. Patents—May 8,
1918; April 23, 1918.
Letters Patent in
Canada.

CHRISTIE

COMBINATION

Keyless Lock for Fords Sells Because It's Safe

The largest bank vaults in the world are protected by combination locks. Why not the Ford car? Positive protection for Fords is assured by the CHRISTIE Combination Keyless Lock. A turn of one or more buttons locks the ignition securely. It is impossible to wire around this lock. The combination must be known before the engine can be started. The reason for CHRISTIE popularity is clear—the lock is safe. Underwriters' Laboratories Inspected—Reduces Insurance 15%.

Why the CHRISTIE Equipped Ford Cannot Be Stolen

Baffles the professional auto thief. Thousands of combinations are possible. What chance would a thief have of hitting the right one? Every time a new combination is tried it is necessary to get out and crank the car to see if it is unlocked, because there are no tumblers to drop into place—and in fact, there is no way of telling either by sound or feeling when the combination has been unlocked.

The CHRISTIE is securely bolted to the coil box. The heads of the bolts are covered by the top of the lock and cannot be removed.

The cover cannot be taken off when the CHRISTIE is locked. It also wedges the coils in the coil box. This prevents removal of the coils.

The Ford Is Locked Automatically When the Engine Is Stopped

When the Ford driver turns one of the buttons on the CHRISTIE Lock the ignition is cut off and locked at the

same time. No more trouble than turning the ordinary ignition switch.

Why This Is a Better, More Profitable Dealer Proposition

PRICE

\$6.00

**MONEY BACK
GUARANTEE**

Before any proposition can be a success a demand for the article must exist or must be established. Surely, no one will doubt the present demand for a good lock for Fords. Investigate the CHRISTIE and you will find it an extraordinary lock—not the kind a thief holds in contempt—a safe lock at all times.

**MAIL DRAFT
FOR FIRST
SAMPLE LOCK
AND DETAILS
OF OUR
PROPOSITION**

CHRISTIE AUTO LOCK CO.

6607 Dorchester Ave. CHICAGO, U.S.A.

**NO
KEYS
ARE
USED**



**CANNOT
BE
WIRED
AROUND**

A Tire You Can't Help Talking About



NOT a bit of trouble talking tire facts—if they are Perfection Asbestos Protected Tires. Take just three for example:

PERFECTION FACTS

(Paste them in your selling hat)

- 1** Made by hand, under expert supervision, with an extra ply of the best long-fibred Sea Island fabric in a factory that's as up-to-date as the morning paper.
- 2** Protected against the heat of curing and road friction; against grease, acids and moisture, Perfection Tires mean more miles. It's the Asbestos Insulating Strip that does it.
- 3** Back of Perfection Tires is Nemours responsibility, the responsibility of a corporation that covers the markets of the world.

And then there are these adjustments:

Perfection A. P. N. S.* Tires, Adjusted 8000 miles basis
 Perfection A. P. Plain Tread Tires, Adjusted . 7000 miles basis
 Perfection Rib Skid Tires, Adjusted 6000 miles basis
 *Asbestos Protected Non-Skid.

Write to us today for a sales plan that works.



THE NEMOURS TRADING CORP.

General Sales Department for

Perfection Tire & Rubber Company

151 Fifth Avenue

New York, N. Y.

Are You Buying Your Storage Batteries at the Right Discount?

Molter Service Co.—Offers you their New Service Plan
 'which enables you to buy Storage Batteries at a discount of

50 %—10 %—5 %

*14 Years of Manufacture behind the M & M
 has produced a battery that has no equal*



The use of antimony as commonly used with lead to make an alloy, has been dispensed with in all M & M grids or plates for a metal mined in its natural state containing the properties essential to the making of a grid which will keep its shape throughout its life, and will not buckle.

The M & M ignition batteries steel case are equipped with a post that has a combination grease cup attachment, thus eliminating all post corrosion.

Our records show from three to seven years' life on this battery, and two to four years on starting batteries.



Cedar separators used in M & M Batteries through special treatment will not shrink, shrivel or shred, thus making it the best insulation obtainable.

A real guarantee: If an M & M fails to develop at least 80% of its efficiency at the end of one year said battery will be restored to at least 80% of its original capacity.

Are you going to be one of the thousand dealers who will take advantage of my new service plan, territory now being allotted.
Write or wire for full information.

MOLTER SERVICE CO.

SALES OFFICES, ASSOCIATION BUILDING, CHICAGO, ILL.

Hartford

SHOCK ABSORBER



If a Giant Smoothed the Roads for You

EVERY motorist dreams of long, level boulevards where he can ride along in velvety ease, without constantly looking for bumps or holes. This pleasure has been practically given to many of them, for regardless of rough places, their cars glide along as evenly as though a giant had smoothed the road.

These motorists have Hartford Shock Absorbers on every spring. They save gasoline, get more tire mileage and longer life for their cars.

This is Why

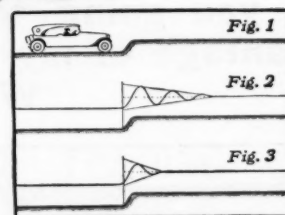
Hartford Shock Absorbers regulate spring movements, gently softening the harmful vibrations started by road bumps. They absorb the shock themselves and thus prevent its transmission to the car, saving wear and tear on every part.

Hartfords move with compression or expansion of the springs. They prevent jolts and jouncing, either up or down—adding miles to the tires and better mileage to the gallon of gasoline. Every time you put on your brakes to take a bump, you tear your car and wear your tires. With Hartfords, you don't even have to notice the ordinary bad roads.

There is a model that will fit your car. We want you to realize the super-goodness of this shock absorber. If you will ask the man who sold you your car, he will put Hartfords on it for you. Try them for thirty days. Unless you are thoroughly satisfied that they are all we claim—your money will be refunded.

EDWARD V. HARTFORD, Inc., 146 Morgan St., Jersey City, N. J.

Factory Branches—Boston, 319-325 Columbus Ave.; Chicago, 1716 Michigan Ave.

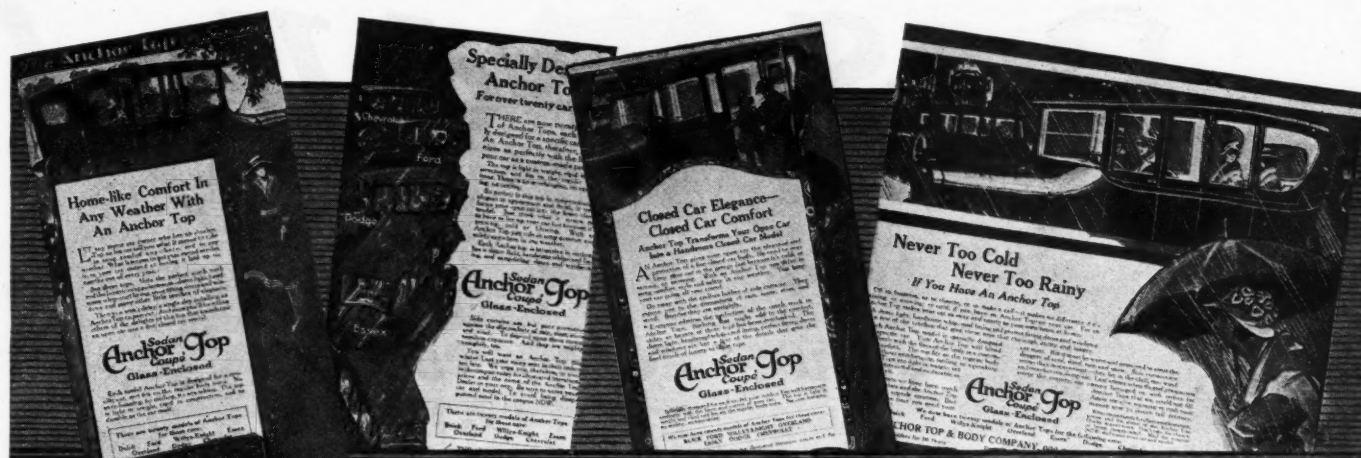


How It Works

Fig. 1—Automobile approaching road bump.

Fig. 2—Movement of car body when car NOT equipped with Hartfords meets bump.

Fig. 3—Movement of car body when car EQUIPPED with Hartfords meets bump. Note how the Hartfords dampen the vibrations, saving you from discomfort and protecting your car.



The Sales Driving Force Behind Anchor Tops

ANCHOR TOP advertising appearing in such publications as the Saturday Evening Post, Literary Digest, Successful Farming and Motor, in full and half-page space, if placed side by side would extend over a million feet. These powerful advertisements are telling motor car owners the country over about Anchor Tops.

Each advertisement is an Anchor Top salesman. Hundreds of motor car owners who never thought of a closed body for their open cars will be convinced. As a result this year will bring Anchor Top dealers a bigger demand for these tops than ever before.

Sedan **Anchor Top** *Coupe* Glass-Enclosed

Anchor Tops are the work of master coach builders. To see an Anchor Top is to buy one. These tops sell themselves. A dome light, handsome whipcord lining, snug-fitting doors and windows are but a few of the details that give these tops the appearance of the finest custom-made product.

There are now twenty Anchor Top models for the following cars:

Buick Ford Willys-Knight Overland
Essex Dodge Chevrolet

Specially designed for each specific car, these tops harmonize perfectly with the lines of the body. No squeaking, no overhanging, no rattling. Every Anchor Top owner sells more Anchor Tops for you.

Write today for our agency proposition. Get your share of the Anchor Top business we are creating. We can only supply a limited number of dealers, so to be sure of getting **your** supply cut out the coupon now and mail it to us. It will bring you some mighty interesting facts.

THE ANCHOR TOP & BODY COMPANY

Fine Coach Builders for 30 Years
322 South Street, Cincinnati, Ohio

THE ANCHOR TOP & BODY CO., 322 South Street, Cincinnati, Ohio

Please send me full detailed information regarding your agency proposition.

Name I sell the following cars.....

Address

City..... State.....

(76)



Speed Up!

Don't let old fashioned, slow, cumbersome Repair Work Methods rob you of your profits.



PRESSES
CRANES
ENGINE
STANDS
BENCHES
WRECKING
CRANES
OIL
SERVICES



MANLEY Garage Equipment will increase your garage earnings. It will enable you to handle a greater variety of work in much less time, and do it better, more efficiently and more profitably. Manley Garage Equipment means fewer men, the saving of time, the prevention of congestion and multiplied production. Whether it is the PORTABLE CRANE or the WRECKING CRANE that you call upon to do a job, you will find that it does the work in double-quick time. They never tire, lag or make mistakes, and operate

with orderly, organized regularity.

Take the ENGINE STAND or the PORTABLE BENCH, which works right at the car, and you will find that they make production flow smoothly and get the job out ahead of the scheduled time. The MANLEY PRESS, with its two-speed leverage, adjustable tables and bolted construction, has a range of adaptability to garage work that will meet hundreds of needs in any shop. Let us tell you how you can increase your repair profits 100 per cent. A letter today will turn the trick.

Manley Equipment has proved itself by four years' use—no experiment

MANLEY GARAGE EQUIPMENT SAVES LABOR—MAKES PROFITS



Portable Oil Service.
1, 2 or 3-tank units.
Self-measuring.

EVERYWAY ENGINE STAND. Fits any suspension.

PORTABLE CRANE.
Well balanced. Extraordinary lift and overhang.

WRECKING CRANE for mounting on trucks.

UNIVERSAL AUTO PRESS. Garage necessity. Fits all work.

PORTABLE BENCH. Work right at the car. Easily handled.

The Manley Manufacturing Co., York, Penna.



METAL KNOWLEDGE AND TRUCKS

Makers of **HALL TRUCKS** started business back in 1873—forty-six years ago.

Not making trucks, of course, but fabricating metals—the essentially vital material from which all trucks are made.

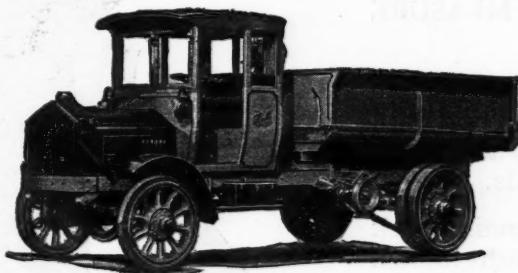
And every hour of every work day during nearly a half century they have been literally up to their eyebrows in metals—

Analyzing, testing, treating, machining, assembling, and manufacturing products composed of iron and steel.

Not slender, delicate metal work, but giant trusses, huge girders, ponderous frames and heavy iron and steel structural elements capable of carrying brute loads and withstanding

vicious shocks and unending vibration.

Certainly no maker has greater working knowledge of the basic material going into motor vehicles than the makers of **HALL TRUCKS**.



A Hall 5-7 Ton Truck

That a really better truck than the Hall is not made has been demonstrated by years of gruelling service in many lines of industry.

We have splendid open ter-

ritory and our selling franchise covers a complete truck line of 4 chassis models and any type of body. We will consider it a privilege to explain our dealer proposition to you. Address, Sales Manager, No. 17 Roby Street, Detroit, Michigan.

As Manufactured by
The LEWIS-HALL IRON WORKS
DETROIT, MICHIGAN.



Sweep Out the Old Funnels and Measures!

—and let the ALL-IN-ONE MEASURE do the work of them all.

Use this handy, clean measure with its flexible metal nozzle. You can fill your car in half the time—without even soiling your hands.

No waste—no muss—no running back to the garage for just the right funnel.

No matter where the oil inlet in your car is located—the flexible nozzle allows you to pour the oil easily and conveniently. All you have to do is to press the lever with the thumb and the oil flows where you want it without wasting a drop.

Sales Department
THE BAILEY-DRAKE CO., Inc.
1120 South Michigan Avenue
CHICAGO, ILL.



PRICE
Coppered \$3.50
Tinned \$3.25

BAILEY-DRAKE CO., Inc.
1120 South Michigan Ave., CHICAGO

Gentlemen:—Please send me full information on the ALL-IN-ONE MEASURE—also prices.
Business..... Date.....
Name.....
Street.....
City.....
State.....

ALL IN Takes
The Place
Of Them All

GODELL PRATT

1500 GOOD TOOLS

Valve Grinders

That Save Time

Valve Grinding can be made much easier, more effective, and more economical by using a Goodell-Pratt Valve Grinder for the job.

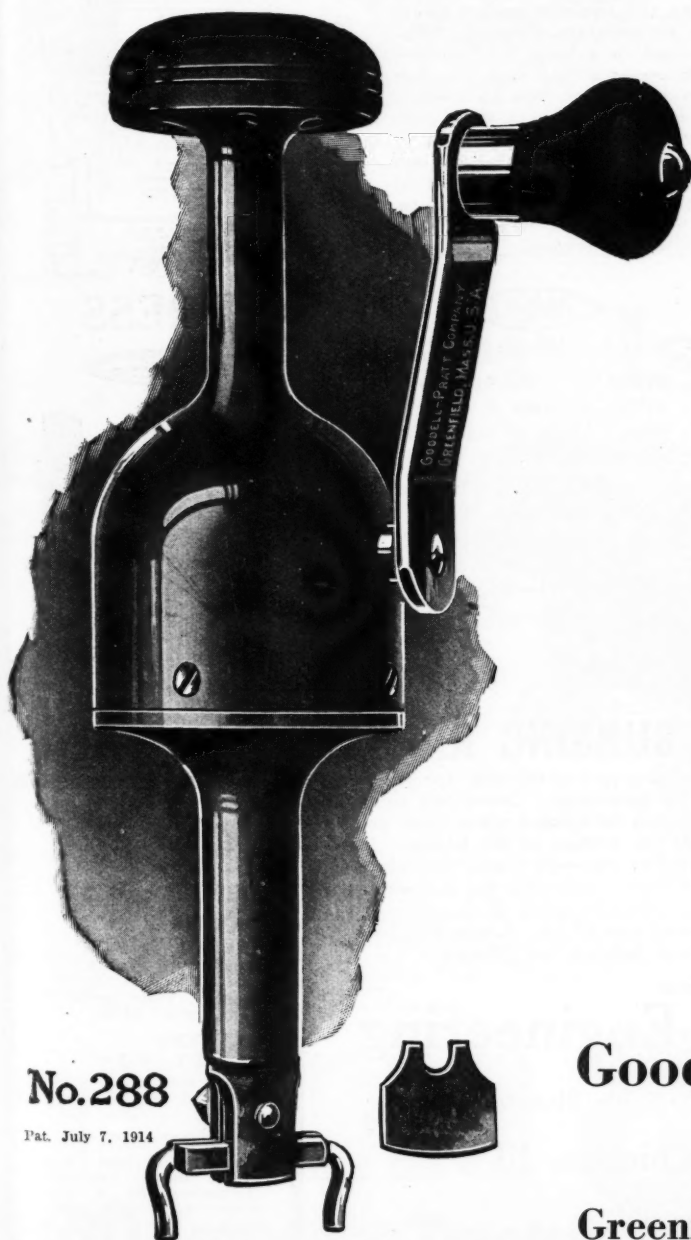
Rotating the crank continually in one direction causes the spindle to oscillate. This motion is necessary to obtain a perfect valve seat, and the weight of the valve grinder is sufficient in itself to require no additional pressure for the best results.

The working parts are entirely inclosed for protection, in the cast iron casing.

This tool is nicely finished in red and black enamel and is provided with both an adjustable spanner and blade. It can be used on any type of valve.

The length over all is $10\frac{3}{4}$ inches, and the weight $3\frac{1}{4}$ pounds.

Send for Tool Book No. 13



No. 288

Pat. July 7, 1914

Goodell-Pratt Company

Toolsmiths

Greenfield, Mass.

U.S.A.



-You Might as Well Try to Run a Shop Without Wrenches

as to be without these Time and Labor Savers

Good Tools Increase Output

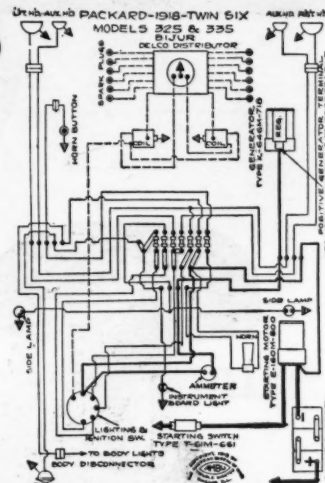
Everything bearing the **AMBU** trade mark is made to save time, labor and money for the man in the repair shop. Our engineers are continually working on new devices—new ideas, new publications, to make the work in the battery and auto repair shop easier and faster. Here are some of the essentials.



Original
Authoritative
Economical
Simple
Handy
Clear
Complete

WIRING DIAGRAMS

The first published diagrams—over five years ago—were **AMBU**. Five years of constant effort. These **AMBU** diagrams—prepared for locating trouble—are clear, simple and easy to follow, for every mark is plain—no complex symbols to study out. Show every wire—every connection—every screw—every circuit. Approved by leading auto and battery men the country over. Every car from 1911 to date has its separate diagram. The 1917-18-19 diagrams are bound in a loose leaf book—other sheets are sold separate—each cut and punched for the book so you can get only those you need—and not a lot for cars you never see. Diagrams for new models can be added as they appear. Diagrams 6" x 9" on tough, long-wearing Kraft paper—several men can work on them at one time. Send \$3.50 for book of 1917-18-19 cars. Complete list—all cars 1911 to date, showing car model and electric equipment, furnished free upon request. Address Publishing Division.



BATTERY STEAMER



Softens the sealing compound in a few minutes so that it can be easily removed. Works while you are busy elsewhere. No chance to burn the battery top cover as with a flame. Supplied either with or without condenser for making distilled water for batteries. Complete — with condenser \$35.00. Without condenser \$25.00. Condenser alone \$12.50.



PLATE PRESS

Doubles the life of the negative plates by pressing compound into grids. Presses 2 or 3 sets at one time. Made of wood with acid resisting finish—no iron can touch plates. No chance to corrode. Supplied with 12 1/8-inch and 21 1/4-inch Transite Boards — \$32.50. Transite Boards alone \$5.90.

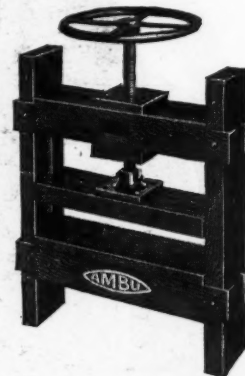
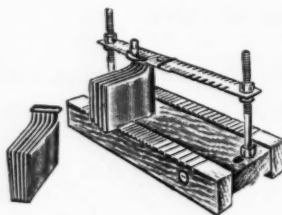


PLATE BURNING RACKS



Holds plates at exactly right spacing and absolutely upright when burning in new ones or attaching new strap. Saves half the time of any other method. Attachments fit around plate, lugs permit puddling lead. No iron touches the bottom of the plates. Made in 2 sizes—smaller one takes two groups—1/8" and thin plates—and large size takes 95% of all types, including the 2 sizes cared for in the small rack.

Every shop needs these. Small size \$7.50. Large \$12.50

Order from Your Jobber or Direct

Appliance Division

American Bureau of Engineering

Makers of the famous **AMBU** Trouble Shooter

1605 S. Michigan Ave., Chicago, Ill.

If it is marked **AMBU** it is right



SPECIALTIES

BATTERY CARRIERS

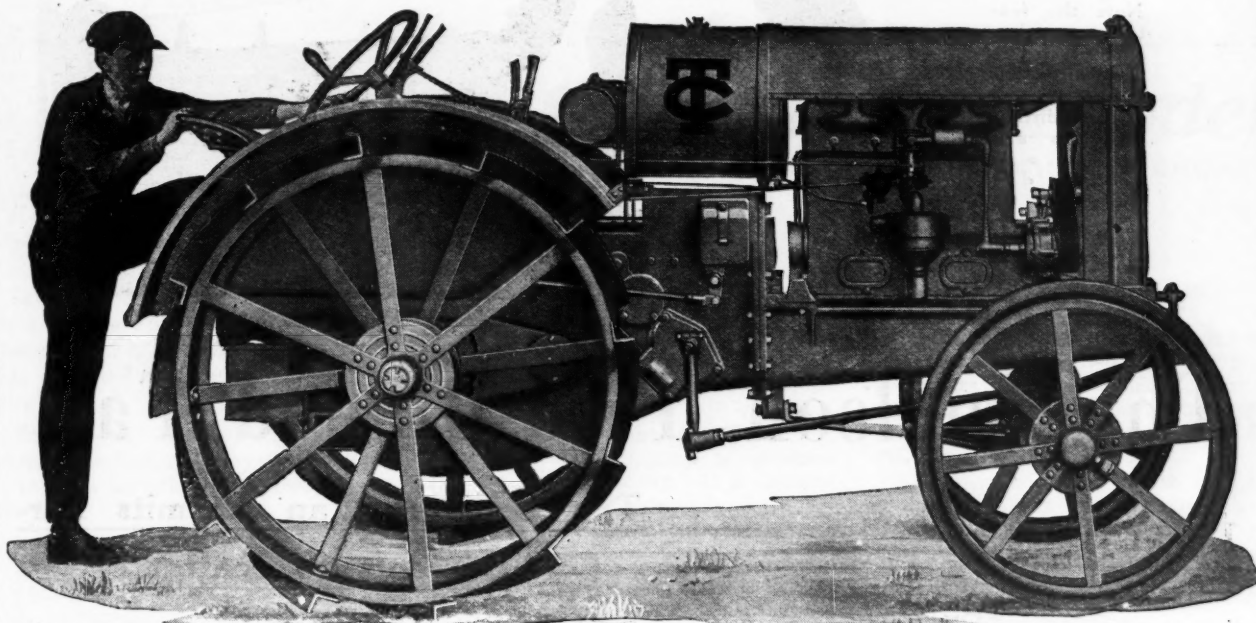
Carry battery like a suitcase. One man can carry two batteries—\$1.50 each; pair, \$2.50.

BATTERY TURN TABLES

Makes work on batteries fast and easy. Every shop needs several. \$2.50.

LEAD MOLDS

Puts waste lead into usable form. Pay for themselves in a few weeks—\$1.50 each; pair, \$2.50.



Twin City 12-20—the most powerful tractor in its class

Power Is Money

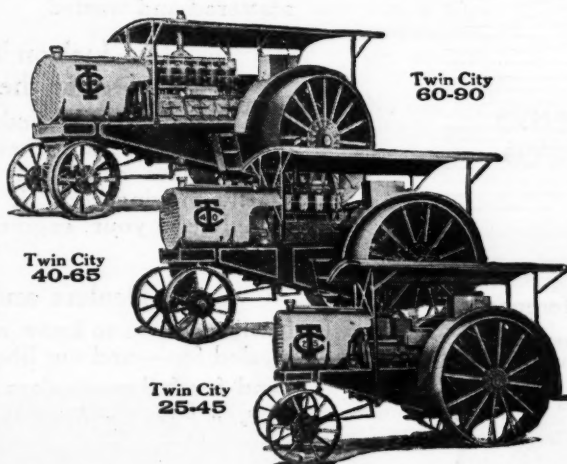
EVERYBODY knows "Money is power." To the tractor dealer it's equally true the other way round—*power is money.*

Here is, we firmly believe, the strongest and most powerful lightweight tractor and the cleanest, best looking job you've seen—not built to meet a price, but built to do the *work*.

We are also firm in the belief that our dealer proposition is the most advantageous you could wish for—with every selling argument you could possibly desire.

Backed by one of the largest factories in the world and one of the strongest organizations.

Reinforced by a widespread national



and localized advertising campaign and the co-operation of a live sales force.

A proven and tried product, strikingly simple, thoroughly accessible, already subjected to gruelling farm service—embodying exclusive features never before applied to tractor use:

The 16-valve engine (valve-in-head type) with removable cylinder sleeves and counterbalanced crankshaft.

Bosch High Tension Magneto ignition.

Sliding spur-gear transmission, two forward speeds, *direct drive on both*.

If possible, we suggest that you visit the factory or branch nearest you. Otherwise wire or write for details of discounts, territory, etc.

Minneapolis Steel & Machinery Company, Minneapolis, U. S. A.

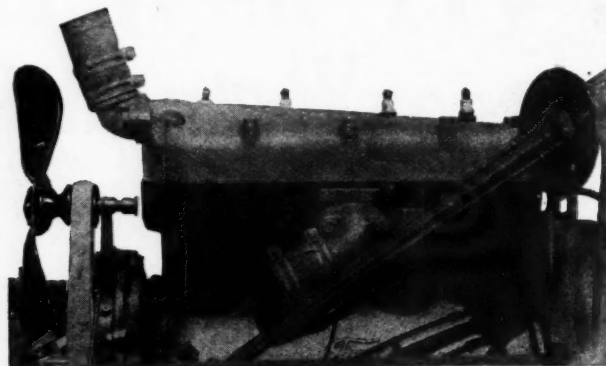
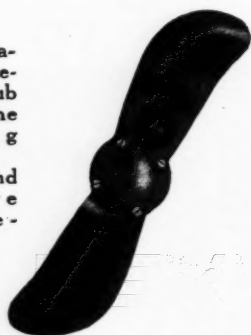
Manufacturers of the Famous Twin City 16-30, 25-45, 40-65 and 60-90 Tractors
BRANCHES—Denver, Colo.; Des Moines, Ia.; Fargo, N. D.; Great Falls, Mont.; Salt Lake City, Utah; Spokane, Wash.; Wichita, Kan.; Winnipeg, Manitoba; Regina, Calgary.
EXPORT OFFICE—154 Nassau St., New York City.

DISTRIBUTORS—Twin City Co. at St. Louis, Mo.; Dallas, Tex.; Houston, Tex.; San Antonio, Tex.; Amarillo, Tex.; Crowley, La.; Baskerville & Dahl, Watertown, S. D.; Frank O. Renstrom Co., San Francisco, Calif.

TWIN CITY

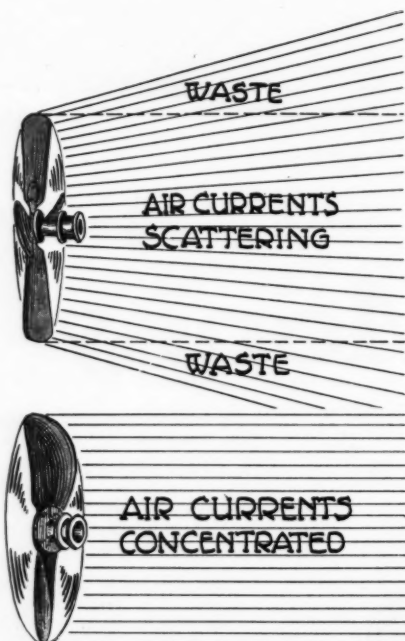
12-20 Kerosene Tractor with 16-valve engine

Note the feature cone-shaped hub protecting the bushing against dirt. Blades and bushings are instantly detachable.



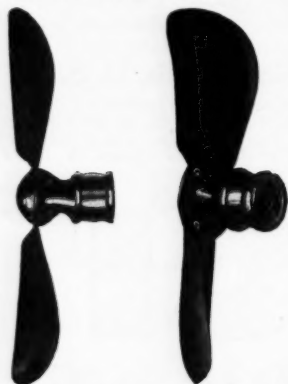
The Juelson Two-Bladed Fan

The Ordinary Fan Permits Air-Currents to Scatter



Note the Difference

The upper diagram shows the old-style four-bladed fan. The lower, the new Juelson two-bladed fan.



THE Juelson Two-Bladed Fan marks a new epoch in aeronautic engineering. It establishes the intelligent direction and use of air currents by means of its peculiarly spoon-shaped blades. It intensifies the air currents and delivers them in the exact direction and in the exact place.

The old-style fan is so constructed that most of the air currents slip off the tips of the blades and are scattered and wasted.

The Juelson Two-Bladed Fan Controls the Air Currents

The Juelson two-bladed fan is so constructed that the air currents are directed and driven over all of the surfaces of all of the cylinders—a shaft of swiftly moving cool air just wide enough to bathe completely your engine, keeping the motor and water cool.

Dealers and Distributors

It will pay you to know more about the Juelson two-bladed fan—and our liberal selling plan. Send for full particulars.

Juelson Fans for Ford cars are now available through your jobber.

American Aero Company
 GENERAL OFFICES
 2637 Michigan Ave
 CHICAGO, ILLINOIS

Sales Department

J. Wadsworth Staff
 616-622 South Michigan Blvd., Chicago

Branches

New York
 Baltimore

Atlanta
 Dallas

San Francisco
 Toronto

Winnipeg
 Vancouver

NEW

Mitchell
SIXES

Our Victory Model

A TWO-YEAR REVISION—OVER 100 IMPROVEMENTS

A Fine Opportunity

The new Mitchell Six offers high-class dealers a very rare opportunity. Many such dealers have discovered this fact and have made a Mitchell alliance.

Today the Mitchell dealers are among the leaders everywhere. This is to urge on others a knowledge of the facts.

A Superior Six

This new Mitchell is a two-year revision of all standards in this class.

There are over 100 improvements. Most of them are for added strength, endurance, smoothness and economy. Ask us for the details.

The object is a more enduring Six. A Six that will keep its newness, cut down service, upkeep and operating cost. And which will hold for Mitchell, as the years go by, the top place in this class.

Thousands of these new cars are now running. They are everywhere bringing new respect to Mitchell. And that new prestige is just beginning, as any man will realize, when he learns the facts.

We Are Competent

We know how to build a right-type Six. We pioneered the Light-Six. Our pre-war model was a 14-year development.

The Mitchell plant is a model. It was built and equipped to produce this type economically. It is famous for efficiency methods.

Here we build the complete car—motor, chassis and body. And we build by methods which give matchless value.

We have lately spent \$300,000 on new machinery and equipment to build this better Six. The result is fine workmanship, exacting tests, smoothness, economy, minimized wear and remarkable endurance.

Looks the Leader

This new Six looks the leader. It is new in body, in design, in color, finish and equipment.

It offers scores of improvements which appeal to the man who is buying a car to keep. Lasting newness, longer service, lower upkeep are apparent everywhere.

The quality is evident. No one can deny it. And every car which goes out is an excellent Mitchell salesman.

Many Able Men

The Mitchell organization today includes many able men. In the past two years we have added scores of new specialists. The management will appeal to any high-class dealer. So will the Mitchell distributors.

The Mitchell factory with its new equipment is a most impressive sight. Up-to-date methods, proper tests and inspections, infinite care are everywhere in evidence.

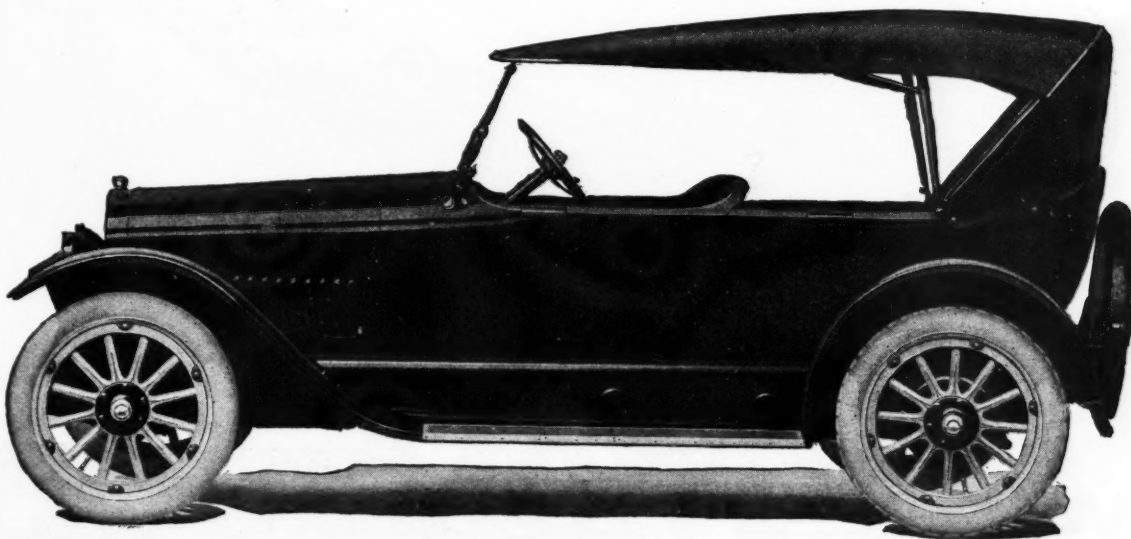
Mitchell advertising carries the story of this new-type Six to millions every month. The result today is a demand which breaks all Mitchell records.

We urge investigation from dealers who seek high quality, stability, high standards, good principles. In some desirable localities we can offer such dealers the most appealing car in its class.

5-Passenger Touring Car—\$1690 f.o.b. Factory
120-Inch Wheelbase—40 h. p. Motor
3-Passenger Roadster, same price
Also built as Sedan and Coupe

7-Passenger Touring Car
\$1875 f.o.b. Factory
127-Inch Wheelbase—43 h. p. Motor

MITCHELL MOTORS COMPANY, Inc.
Racine, Wisconsin



Standard Equipment

GABRIEL SNUBBERS

Make Your Car Ride Easier and Last Longer



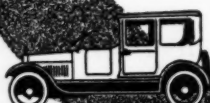
Packard



Pierce-Arrow



Peerless



White



Buick



Studebaker

Kissel Car



Moline-Knight



Auburn



Essex



Hudson



Chandler



Dodge



Oldsmobile



Hupmobile



Chalmers



Ford Government Ambulance



General Motors Government Ambulance



Is Your Car Here?

All these cars are either standard-equipped at the factory with Gabriel Snubbers, or have holes in the frame for them.

Profit by the experience of these builders—use Snubbers to make your own car ride easier and last longer.

GABRIEL MFG. CO.

1415 East 40th St., CLEVELAND, O.



GABRIEL SNUBBERS keep the car from bouncing just as easily as the boy holds the bull—it's the COIL that does the trick.

A Regular Wrench for Real Work

That sliding T handle in the Billmont gives her a twist that no amount of rust or resistance can fight. When the hook nose on the Billmont gets hold of a nut or bolt it's simply got to go.

And the Billmont gets hold of them and don't you forget it. Look at this Overland 90 job! Wouldn't that be a poser for any ordinary wrench? And yet the Billmont goes right in and spins them off. No nut or bolt too hard to reach, too tight to turn.

Car Owners—Buy the Billmont, one wrench instead of twenty.

Repair Men—speed up your work and your profits with a Billmont.

Dealers—write to your jobber or us and stock this fast seller.

When not in use five hexagon sockets in standard sizes and adapter (so that any socket can be used) and sliding handle go inside—a compact, neat, handsomely finished tool—the whole set retails for \$10.00. (In wooden case.)

Edgar C. Guthard Co.
361 East Ohio Street
Chicago, Ill.
U. S. A.

Branches:

341 Phelan Bldg.,
San Francisco
230 Rialto Bldg.,
Kansas City
207 W. 76th St.,
New York City
628 Plymouth Bldg.,
Minneapolis

BILLMONT MASTER WRENCH

"The Wrench that Spins'em off"

The Standley Adjustable Luggage Carrier

For Fall Hunting and Fishing

Who wants to make a trip up to the lakes, or anywhere else, with a lot of excess luggage dangling all over the fenders, running boards and rear springs?

Nobody does—or will—if he can get a **STANDLEY ADJUSTABLE LUGGAGE CARRIER** from under the seat, unfold it and adjust it to the proper size to contain all excess luggage.

There are hundreds of motorists—many of them your own customers—who will buy a **STANDLEY** on sight.

The **STANDLEY** fits any car, is quickly detached, forms a complete basket and needs no permanent attachments. Clamps are provided with lock nuts which protect them from working loose.

Adjustable to any length from 10 to 44 inches.

Dealers—Order from your jobber. If he can't supply you, write us direct. Retail price \$6.00.

STANDLEY SKID CHAIN CO.

BOONE, IA.

Eastern Branch:

334 Second Ave., Pittsburgh, Pa.

\$6

Fits any
Car



Standley Adjustable Camp Grid.—Just the thing to use for preparing meals on tour. Sells fast to motorists starting out on long trips, or picnic parties. Folds to convenient size for carrying. Liberal profits for dealers. Retail at \$1.50.

Write Us—Let Us Tell You How **GRID-IRON-GRIPS** FOR TRACTOR WHEELS

Can Help You Make Tractor Sales

You need not lose tractor sales because a farm is too hilly, too sandy or the soil too wet and heavy for ordinary lug equipment. Grid-Iron-Grips have proven to be a great achievement in the interest of tractor success and make any wheel tractor a superior sure-footed Tractor, dependable to maximum capacity in all kinds of soils or plowed ground.

Will Eventually Be Universally Used

for the Grips are **self-cleaning** and **Lay a Hard Road Across a Soft Field**, two very important items, which so greatly increase the usefulness of tractors for all-year-round

Tractors will perform more work, per gallon of fuel, when equipped with Grips, because every atom of engine power is utilized profitably, with no loss from slippage and also because tractors work much easier across soft ground, as the wheels roll freely upon a level steel tract, thus allowing more power to be delivered at the draw bar.

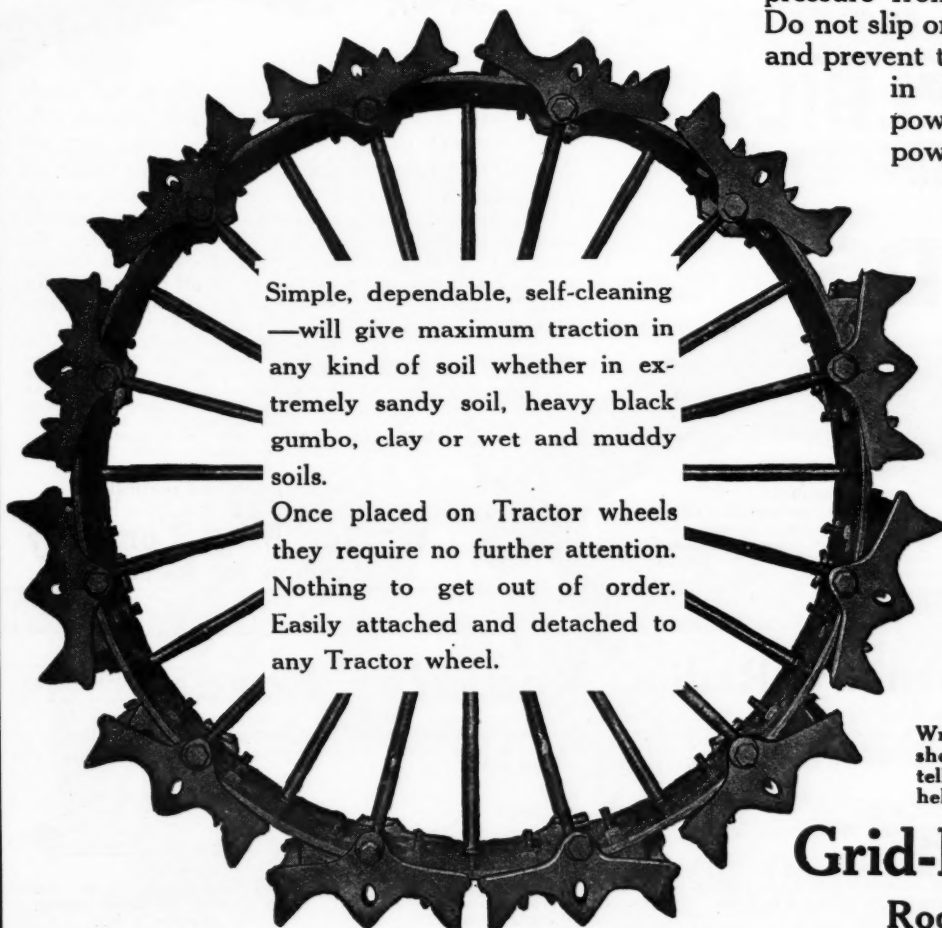
work, on any farm that can be farmed with horses.

The wheels lay the Grips straight down and lift them straight up—no climbing or back pressure from soil in front of wheels. Do not slip or skid on slopes or "dig-in," and prevent the wheels from "spinning" in mud or sand. Traction power is limited only to the power of the engine, as the gripping power of the Grips is so great they can stall the engine without slipping in mud or soft ground.

No time is lost making lug changes on wheels equipped with Grips as the Tractor is always ready for all kinds of farm work or hauling on hilly, muddy or macadam roads.

Grid-Iron-Grips prevent packing of the soil and sub-soil by distributing the weight on the wheels over a large, flat area.

Write for full information and literature showing the Grips in action. We will tell you of the many ways they can help you make tractor sales.



Simple, dependable, self-cleaning—will give maximum traction in any kind of soil whether in extremely sandy soil, heavy black gumbo, clay or wet and muddy soils.

Once placed on Tractor wheels they require no further attention. Nothing to get out of order. Easily attached and detached to any Tractor wheel.

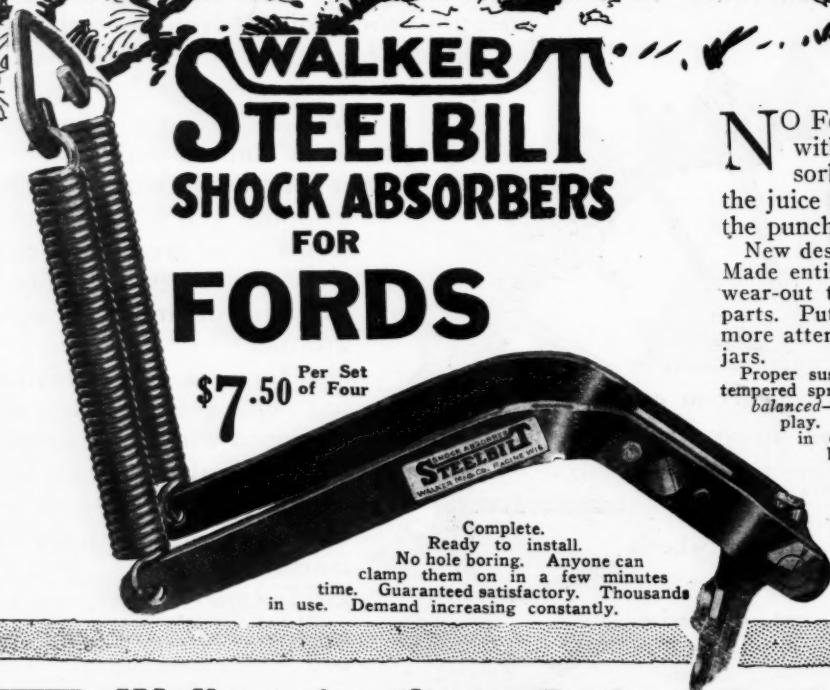
Grid-Iron-Grip Co.
Rock Island, Illinois

DON'T LET BUMPY ROADS BLUFF YOU



WALKER STEELBILT SHOCK ABSORBERS FOR FORDS

\$7.50 Per Set
of Four



Complete.
Ready to install.
No hole boring. Anyone can
clamp them on in a few minutes
time. Guaranteed satisfactory. Thousands
in use. Demand increasing constantly.

NO Ford owner backs down for rough roads with a set of Walker Steelbilt Shock Absorbers under his car. You can turn on the juice and forget the jolts. Steelbilt takes all the punch and pound out of the meanest going. New design. Without a single undesirable feature. Made entirely of steel—positively unbreakable. No wear-out to them. No working loose. No sliding parts. Put them on—and that puts an end to it. No more attention—no care—no more rocking jolts and jars.

Proper suspension of long, strong, wonderfully resilient, oil tempered spring deadens vibration. Keeps body of car level—balanced—on sharp curves or steep inclines. Free easy play. A gentle swing—instead of a quick snap-back as in other types. Cold rolled steel, hardened spring bolts—with oilers. No squeaks—no binding—no bother of any kind. Low price puts them on accessory bargain counter—only \$7.50 per set of four.

Write for prices and particulars.

Walker Mfg. Company
32 Hamilton St., Racine, Wis.

PATENTED

Walker Auxiliary Radius Rods for Fords

PATENTED

Tremendous demand throughout the entire motoring world. All Walker Rods covered by patents. Don't buy infringements. Stocked by nearly all jobbers. If yours can't supply you write us. Walker Radius Rods reinforce—strengthen regular Ford Radius Rod. Brace front axle—help keep it straight—eliminate bending and breakage. Quickly attached without drilling holes. Clamp securely to rear of regular rod—fasten to axle, using regular Ford perch bolt except in 701, which clamps to front axle.



No. 701—Made of solid $\frac{3}{4}$ -in. steel rods. Malleable clamps. Wt. 12 lbs.



No. 702—Made of 1-in. \times 1-in. \times 3-16 in. Angle iron. Wt. 8 lbs.



No. 703—Made of 1-in. \times 1-in. \times $\frac{1}{8}$ in. Angle iron. Jointed arms. Weight 5 lbs.



No. 704—Made of $\frac{1}{2}$ -in. tubing. Malleable threaded clamp. Weight 5 lbs.

BIGGER OPPORTUNITIES!

Offered by the New Full Frame E. & W. Truck Unit

The latest addition to the E. & W. line—a full frame unit equipped with latest improved type of radius rod. This new unit makes it possible—and profitable—to convert the power plant and front end of any chassis into a completed truck of one to five tons capacity with choice of Internal Gear or Worm Drive. The field for dealers is now considerably widened.

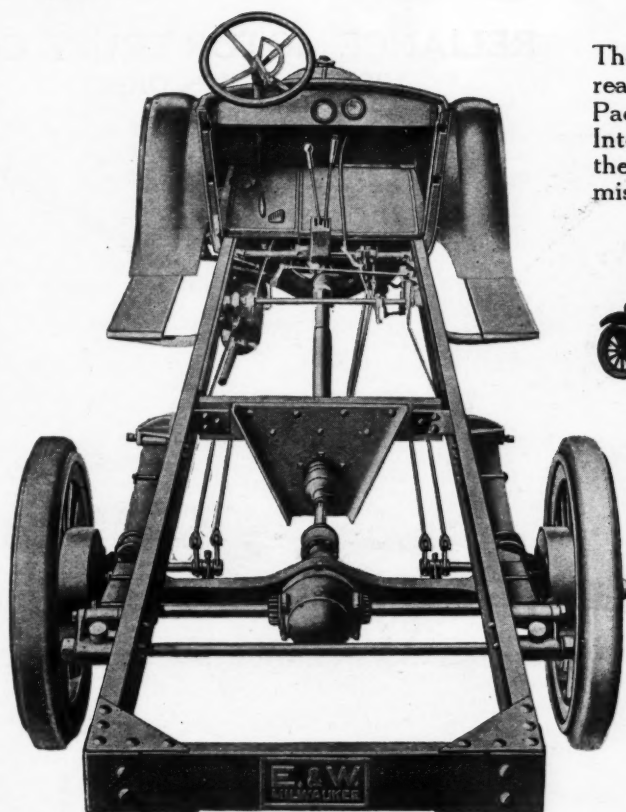


SPECIAL DODGE BROTHERS FULL FRAME

All holes are drilled to accommodate Dodge Brothers power plant, radiator and front axle. The double brake equalizer, brake rods, rear axle, wheels, tires, springs, propeller shaft, etc., are assembled to frame and a complete truck can be assembled in your own shop with only a few hours labor.

E. & W. Transmission Hanger a Decided Feature

The E. & W. Transmission Hanger suspends the rear end Transmission on Overlands, Studebakers, Packards and others. Illustration at left of 2-ton Internal Gear Drive showing method of supporting the Overland transmission with the E. & W. Transmission Hanger.



**EXPRESS BODY
WITH CAB**

Regular equipment includes platform body with removable signboard sections, cab with full width cushion and back upholstered in good grade imitation leather.

Regular equipment includes express body with cab as shown, having upholstered back and full width cushion, flareboards and drop end gate with adjustable chains.



**STAKE BODY
WITH CAB**

DEALERS

Our selling plan is right. Our present dealers like it and they are making money. Write for complete information.

E. & W. MFG. CO.
400 Oregon St., Milwaukee, Wis.

Reliance

EVERY INCH WORTHY THE NAME

MOTOR TRUCKS

An investigation of RELIANCE Trucks, and an investigation among RELIANCE users will explain better than anything else why the RELIANCE holds its position of strength throughout the trade.

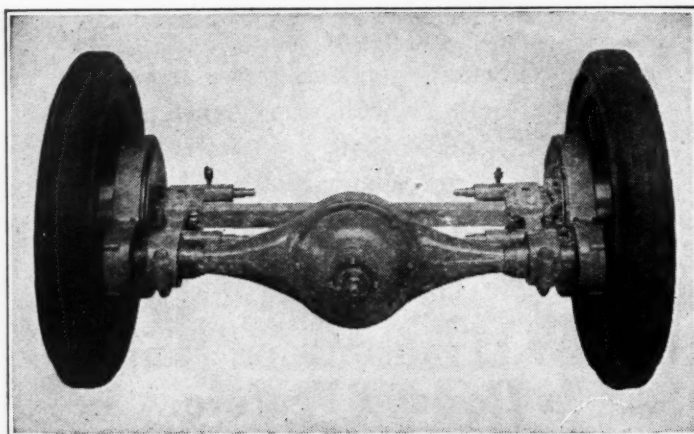
In various fields of transportation the RELIANCE is performing in a creditable manner. It has built a reputation and is sustaining it.

Dealers find the RELIANCE reputation a dependable foundation for initial sales and repeat orders—users find it their assurance of satisfactory service.

Write for detailed information.

Specifications

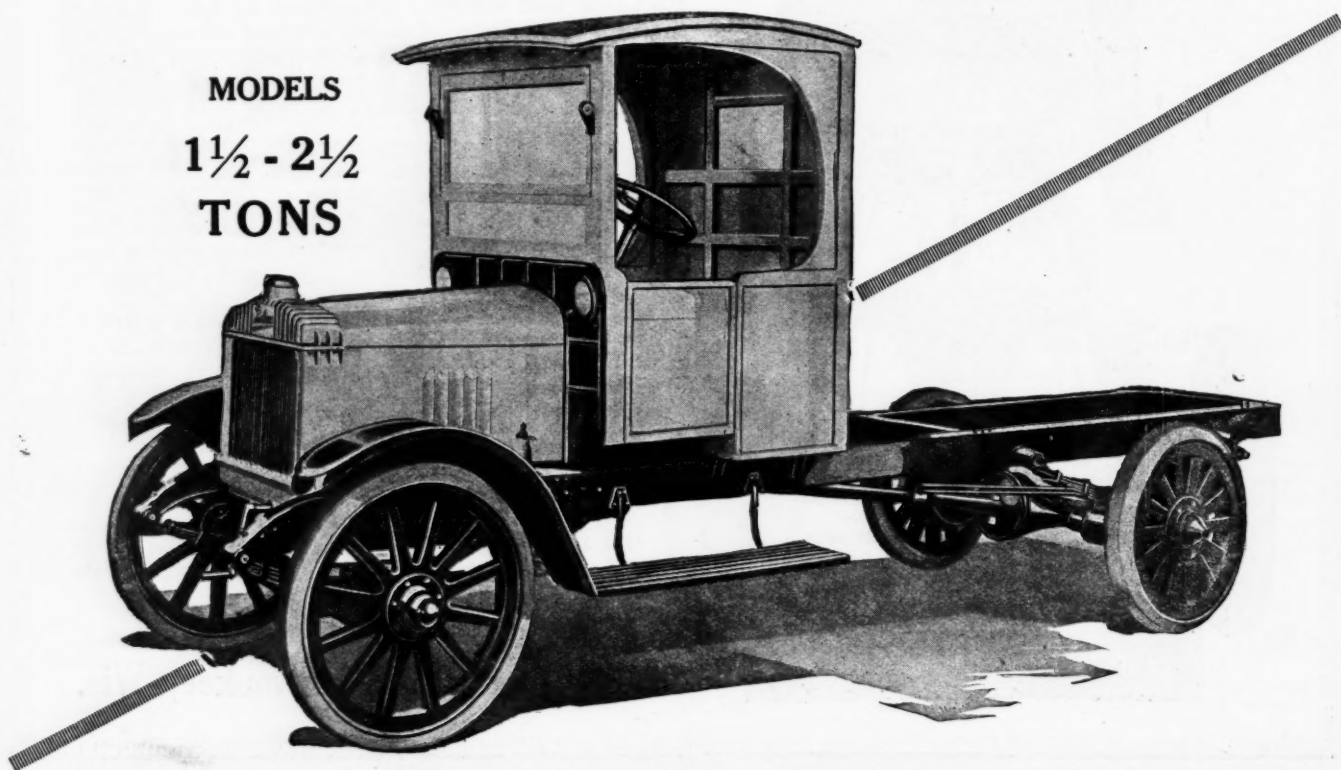
MOTOR—The well known Buda Heavy Duty Truck Motor. TRANSMISSION—Fuller Transmission in unit with motor. CLUTCH—Multiple disc dry plate clutch. CARBURETOR—Stromberg. IGNITION—Bosch Magneto with steering column control. BEARINGS—Front and rear axles equipped with adjustable taper roller bearings. UNIVERSAL JOINTS—Hartford joints, extra large size. FRAME—Pressed steel, larger section than ordinarily used on trucks of same capacity. SPRINGS—Sheldon alloy steel springs. STEERING GEAR—Ross steering gear. RADIATOR—Built-up type, carried on ball trunnions. CONTROL—Left hand drive, center position of levers. REAR AXLES—Badger external spur gear axle on all models.



Badger External Gear Axle Used on All Models

RELIANCE MOTOR TRUCK CO.
APPLETON, WISCONSIN

MODELS
1½ - 2½
TONS



Add Years to a Ford's Life

RIP-ROARING Bosch Sparks mean a **smoother**, cooler, more economically enduring engine for any Ford. Also the Special Bosch Ford Attachment means an additional source of income to the dealer.

Tell every Ford owner the saving in repair, fuel and tire bills and the increased efficiency that his Ford would have plus Bosch High Tension Magneto Ignition. It means an immediate sale.

The Bosch Special can be installed easily and quickly without tearing down the engine or the use of special tools. Be prepared to meet the demand our national advertising campaign is creating.

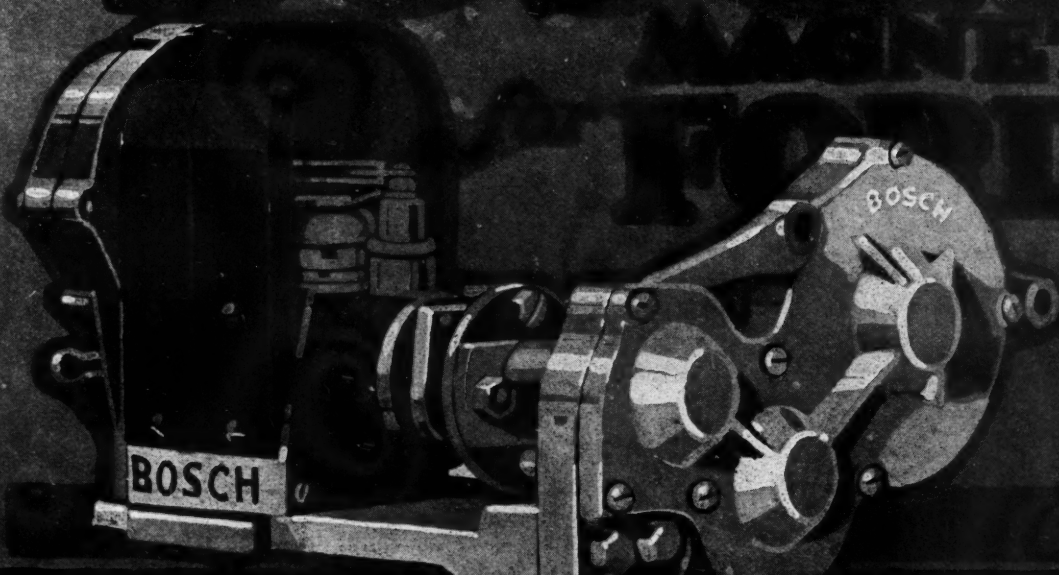
Order your sample Bosch Ford Attachment today.

American Bosch Magneto Corporation

Main Office and Works
Springfield, Mass.

Branches—New York, Chicago,
Detroit, San Francisco.

More Than 200 Service Stations in
Over 200 Cities.



AMERICA'S SUPREMACY IN IGNITION SYSTEM

MOTOR TRUCKS - TRACTORS - AIRPLANES - MOTOR CARS - MOTOR BOATS - MOTORCYCLES - GAS ENGINES - ETC.



THE FRANK PRESBREY CO.

*Takes pleasure in announcing
that*

MR. L. M. BRADLEY

*who has been allied with the
automotive industry since its
inception and until recently
General Manager of the Motor
Accessory Manufacturers'
Association, has become affil-
iated with the Company's staff
of representatives.*

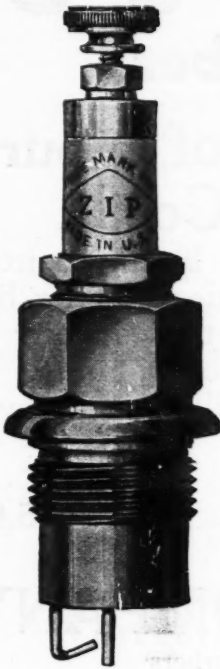
FRANK PRESBREY CO.

General Advertising

456 Fourth Avenue

New York

Two Propositions with Profits and Big Business for Jobber and Dealer



ZIP, a one dollar, non-corrosive Spark Plug—made to stand service. The Copper Alloy metal shell will not corrode; will not "freeze" in the cast iron cylinder or damage threads. The Manganese Nickel Spark Plug points will not burn off. Highly glazed porcelain insulator, a high grade job right through. A size for every car. **PRICE \$1.00.**

The Buzzing Wind Jammer—A Tire Valve at \$2.00

Can be set for desired air pressure—the buzz of the release valve warns you when to stop pumping. You are sure that your tire has the proper inflation without bothering with a tire gage.

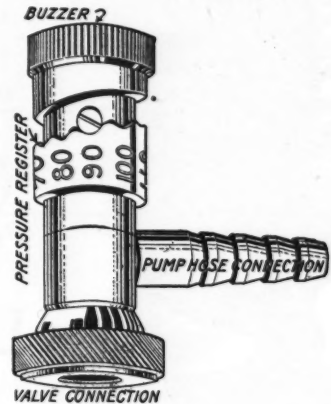
Fits on any pump. Small and of simple construction.

Jobbers and Dealers, write for our proposition today. It means big sales and big business for you.

HARTLEY SCREW COMPANY

132 Central Ave., Newark, N. J.
P. O. Box 405

Dept. O



TRIANGLE TRUCKS

**"Built to Do
A Truck's Work"**



1½ and 2-Ton
Models
Dealers Write

No claim is made for a Triangle that the truck itself will not back up in actual service. And by the way, that's the proper method of determining the merits of a truck—find out what the line **has been doing on the job.**

Triangle claims are based on what Triangle Trucks are doing in many different lines of transportation, in many sections of the country and under many hauling conditions. Everywhere Triangles are backing up the claims made for them.

We can take care of a few more dealers. Write for our dealer plan.

Triangle Motor Truck Co.

St. Johns, Michigan

Eastern Representatives:
Triangle Motor Sales Company
381 Fourth Ave., New York City

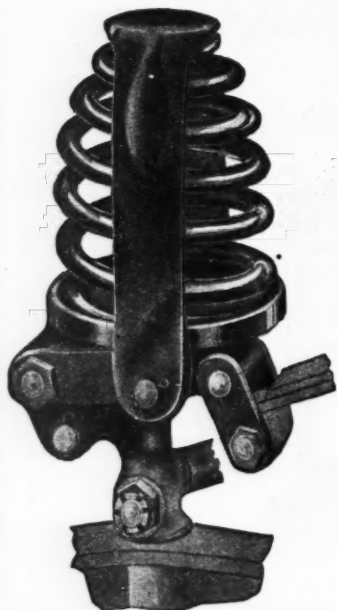
New England Distributors:
Eugene F. Lally & Sons Company
Boston, Mass.



HALLADAY

Direct Suspension Shock Absorber

Gets More Miles Out of Your Ford Car at Less Cost



The Halladay equipped car floats over bumpy, pitted roads, entirely free from those chief enemies of long life—jolts and jars. For the Halladay has the **capacity** to take up all the bumps and vibrations of rough going. This means lower repair, gas and tire bills and it gives you perfect riding comfort everywhere. A boon to car owner and dealer.

Price per set.....\$15.00

Write for full particulars

L. P. HALLADAY COMPANY

Manufacturers of Bumpers, Shock Absorbers
and Automobile Accessories

520-530 Monroe St.

Streator, Illinois

**MOST JOBBERS
AND
DEALERS
SELL
THE
ROSE LINE
OF
PUMPS
AND
GREASE
GUNS**

**ROSE
PRODUCTS
ENCIRCLE
THE
GLOBE**

**MFG BY
J.H. HANEY & CO
HASTINGS NEB**

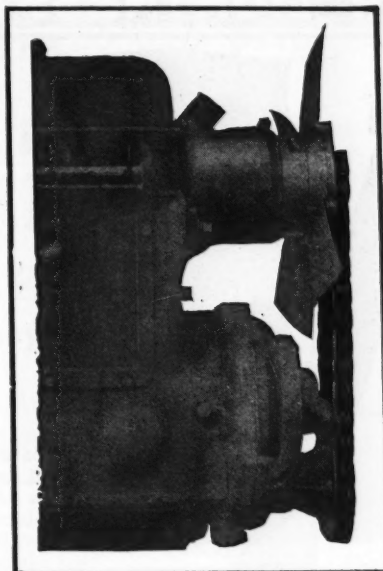
Link "V" on a Nash Motor

Here's a G & K Link "V" Fan Belt on a Nash Motor. The Nash Motors Company adopted it 2 years ago as regular equipment and as proof of satisfactory service they are still equipping their cars with this belt.

The Link "V" Belt is a combination of leather, fibre and steel links, so constructed that the steel and fibre links carry the strain. The leather links only come in contact with the pulley to give the required friction surface. It's long-lived.

There's a Link "V" Fan Belt for each make of car.

Dealers: Write us for our sales proposition



The Graton & Knight Mfg. Co.

Automotive Equipment Division

Worcester,

Mass.



Unlimited Possibilities



Guaranteed for a Full Year

JUMBO

OVERSIZE

MOTOR TRUCKS

Full Line of Sizes

There is a big opportunity in the truck industry for dealers who sell JUMBO trucks—

Here's why: JUMBO Trucks are built of the most widely known units in America—oversize for safety—**guaranteed for a full year, not just 90 days**—and backed by **real sales assistance** for the dealer.

Honestly built—JUMBO Trucks must be honestly sold on their merits. The result: owner confidence, good will, repeat business.

There isn't a single dissatisfied JUMBO owner in the country that we know of. There isn't a single JUMBO dealer that is not making money. These facts should convince you that the JUMBO agency is a very profitable one.

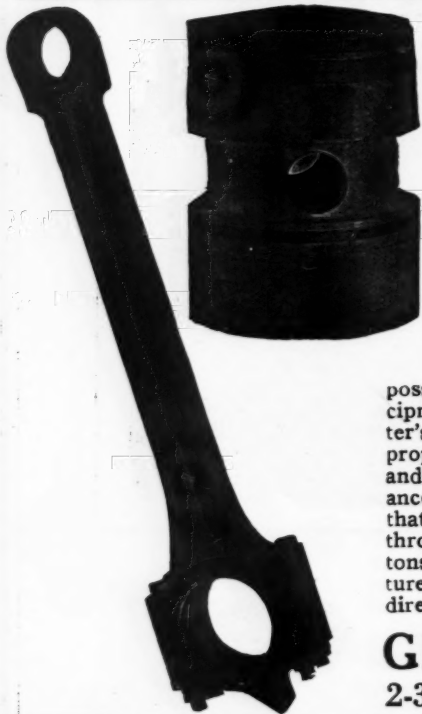
Write for full information about this valuable agency.

NELSON MOTOR TRUCK CO.
Saginaw Michigan

JOHN SIMMONS COMPANY
102-110 Centre St. New York City

Eastern Distributors and Export Representatives

ALUMINITE (ALUMINUM ALLOY) PISTONS AND CONNECTING RODS FOR LIGHTNESS—HARDNESS AND STRENGTH



Just before you shift into second on a hill—you can almost feel those heavy reciprocating parts hesitate because of their excess weight. Along on the level road you may be sure that this excess weight is pounding crank pins out of round and that later on the crank shaft will be up for repairs. With the car standing you can see the result of this excess weight in shaking, shivering vibration. At all times this weight is utilizing gas that should be giving increased mileage.

Aluminite (ALUMINUM ALLOY)

PISTONS and CONNECTING RODS

possess all the advantages of heavy reciprocating parts with none of the latter's disadvantages. Correct design and proper alloy give to Aluminite Pistons and Aluminite Connecting Rods that balance of lightness, hardness and strength that makes for superior wearing qualities through hardest service. Aluminite Pistons remain unaffected at high temperatures. Aluminite Connecting Rods bear directly on the crank shaft—so light is

their action and little their wear that bushings are not needed. Specify both for replacements—together their saving is greater.

DEALERS: Invite us to send you our merchandising proposition. **REPAIRMEN:** Try this: Familiarize yourself with the advantages of Aluminite Pistons and Aluminite Connecting Rods. Then put it up to your customers.

GREEN ENGINEERING COMPANY

2-34 S. St. Clair St.

Dayton, Ohio

for Cylinder Grinding See Our Ad. in Clearing House Sec.

The Most Remarkable Automobile Top Material

LIGHT IN WEIGHT—DEPENDABLE IN QUALITY—NON-CRACKING—NON-BLISTERING—Dridek is Made to Satisfy.

Send to Dept. C for Samples and Prices



L. J. MUTTY COMPANY
BOSTON, MASS.





Complete with Rings
and Pin

Increase Your Mileage 25% for \$2.50

Cochran FORD PISTONS

SAVES REBORING
A size for every CYLINDER

Furnished in Standard Size

Also the following Oversize

.0025 .005 .010 .015 .020 .025 .03125 .045

Light Weight Step-Cut Rings,
Oil Groove

DETROIT METAL PRODUCTS CO.
DETROIT, MICHIGAN

KOEHLER

REG. TRADE MARK

Trucks and Tractors

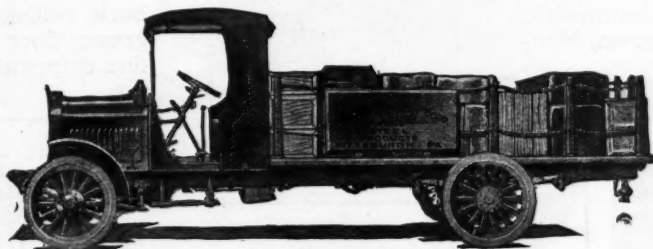
Powerful; Simple; Quiet; Perfected Automatic Oiling System; More Years of Service Guaranteed; Handsome and Massive in Appearance.

The Model "M" Truck has the KOEHLER-HERCULES five-bearing crank-shaft motor, with Tungsten valves, Fahrig metal and Non-Gran bearings, full pressure oiling.

Lavine steering, Brown-Lipe transmission and clutch, Spicer universals, new 2½-ton Timken-Detroit worm drive rear axle. Everything of highest class.

The KOEHLER Line

1¼-ton Model K Truck
\$1450 (Chassis)
3-ton Model "KT"
Tractor \$1535
(Chassis)
2½-ton Model "M"
Truck \$2965 (Chassis)
5-ton Model "MT"
Tractor \$3050
(Chassis)



Model "M"

Dealers

You can make a success with the KOEHLER line, because "built-in service" enables you to "keep that profit." This is the line that sells and that brings repeat orders. Write for our liberal proposition.

The H. J. Koehler Motors Corporation, 158 Ogden St., Newark, N. J.
Established 1895

How Much Profit Do You Make On Gasoline?

Do your books show a profit on your gasoline business or do they show a loss? In any event you should make money on your gasoline sales. Proper equipment is

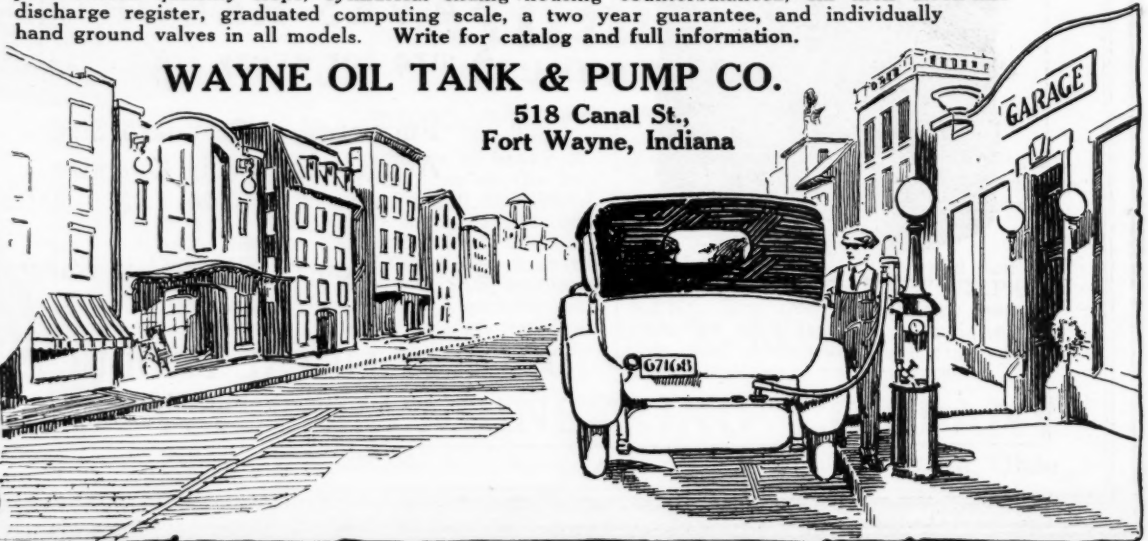
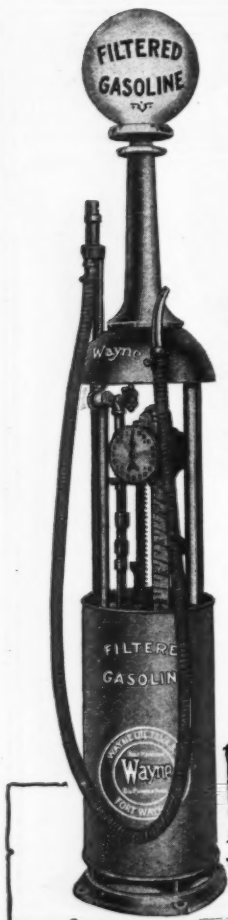
Wayne
Honest Measure Pumps

the answer—equipment that increases the number of sales and volume of business and at the same time reduces your overhead. By giving quick service, honest measure and clean, filtered gasoline, WAYNE Pumps hold the old customers and attract new ones. They build up the volume of business.

Note these exclusive WAYNE features: gear driven meters, continuous forward motion of handle, push button quantity stops, cylindrical sliding housing counterbalanced, six inch clock-like discharge register, graduated computing scale, a two year guarantee, and individually hand ground valves in all models. Write for catalog and full information.

WAYNE OIL TANK & PUMP CO.

518 Canal St.,
Fort Wayne, Indiana



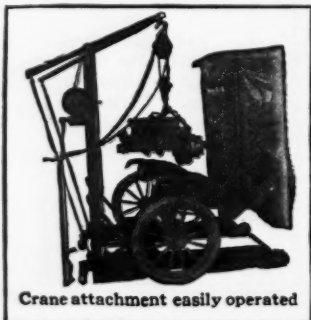
KLEMME

ONE MAN AUTO HOIST AND CRANE

"I or my men would not go back to the old system of dark, dirty, foul pits under any consideration. From actual check I find the use of our KLEMME Hoist cuts down the time 25 per cent." This is what A. F. Van Dinter, well known automobile repair man of Lewistown, Montana, writes.



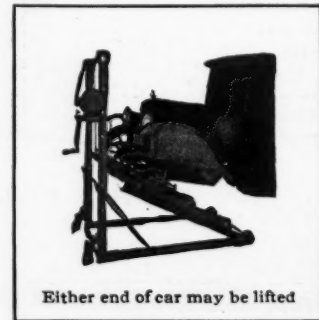
WITH this simple, strong and safe device one man can raise with ease either end of a motor car or truck to just the height desired, so as to enable a repairman to work underneath the car without lying on his back, rolling around on a dirty, greasy floor with oil and gasoline dripping in his face.



Crane attachment easily operated

The KLEMME One Man Auto Hoist and Crane may be easily moved from one part of the garage to the other, or into the street if necessary.

Manufactured by
A. C. KLEMME MFG. CO., Davenport, Iowa
Sales Department
BAILEY-DRAKE COMPANY, Inc.
1120 So. Michigan Ave., Chicago



Either end of car may be lifted



The Shock Absorbing Acme Bumper Protects the Car Without Damage to Itself

G LANCING side blows—head on shocks, are all parried by the Acme Bumper.

It so absorbs the blows that it not only protects the car but does this without any damage to itself. You'll never find an Acme bent or twisted out of shape.

For 3½ inches back of the protecting front channel bar is a straight bar, between these are five strong coil springs that diffuse the shock—taking it up before it reaches the car. From

this strong spring cushion run arms of steel back to the frame—clamped on with a bulldog grip.

Rubber inside the springs insures against any rattle.

The Acme Bumper is made of high carbon steel—finished in nickel and black. It fits any car and goes on either front or back of car.

Write your jobber for Acme Bumpers—it pays you a profit that makes selling it worth while. Write today—now.

Jobbers—Get our liberal trade proposition, also write for a sample bumper.

Clevenger Engineering and Sales Co.

86 McKinley Place, Ridgewood, N. J.

A New *Usaco* Compressor AIR COMPRESSOR

Two Stage

**LARGER STRONGER
MORE POWERFUL**

Automatic

WITH
IMPROVED
FEATURES

HERE is a development of the Usaco De Luxe compressor of which thousands have been sold—a machine designed specifically to meet the ever growing demand made by the wide adoption of pneumatic truck tires and still have a surplus of capacity and efficiency. The same essential features responsible for the remarkable success of the De Luxe Compressor have been retained and new features added. Notable among the improvements are:

The Usaco Air Purifier which acts automatically each time the compressor stops, blowing out oil or moisture that may have accumulated and thus assuring that only pure air will go into the tires.

A High Pressure Tank, double the size of the standard De Luxe, providing capacity for the most severe service ever en-



countered in inflating Giant Truck Tires, will be furnished for either 200 or 250 pounds working pressure.

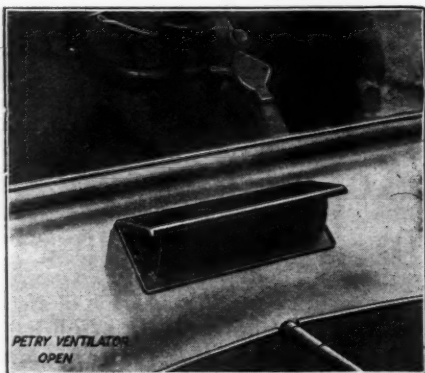
A Fan Type Fly Wheel which assists greatly in keeping the compressor cool.

One horse power motor, affording double capacity.

These features, and several others, as well as the Superior two-stage principle of operation are described in our circular which will be sent free on request. Everyone interested in tire inflating should have a copy.

**The United States
Air Compressor Co.
6534 Carnegie Ave.
Cleveland, Ohio**

By Far the Best by Every Test



THE PETRY VENTILATOR

THROWS a cooling air to that overheated place, the floor up under the cowl. The heavily nickeled, solid brass knob on dashboard regulates quantity of air wanted. The adjustable baffle-plate throws the air to any desired point. The Petry Ventilator adds snap to the appearance of any car. Easy to put on. Bolted thru the cowl to a sub-base. Rigid, dust-proof and waterproof when closed. Handsomely designed with beautiful lacquered finish. The only stock ventilator adjustable to the

curve of any cowl. Indispensable to closed cars. Special type for Fords, \$3.00. Universal type, applicable to any shaped cowl, \$5.00, including installation tool. Write for literature. Better send your order now and get prompt delivery.

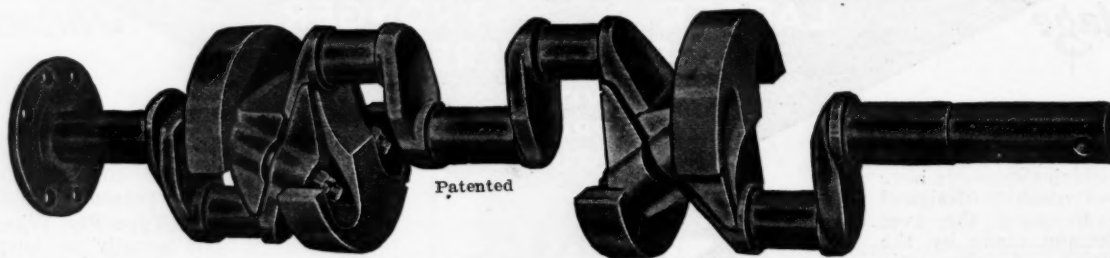
N. A. PETRY & CO., Inc., 1309 Race St., Philadelphia

Makers of the Petry-Cut-Out and Pedal

DISTRIBUTORS

Gray-Heath Co., 1440 Michigan Avenue, Chicago, Ill.
Norman Cowan Co., 445 Rialto Bldg., San Francisco, Cal.
J. W. Van DeGrift, 627 Charles Bldg., Denver, Colo.

All of Our Finest Cars Have Counterbalanced Crankshafts THE FORD CAN HAVE IT ALSO



DUNN'S COUNTERBALANCES FOR FORDS

For three years Ford owners have been realizing the money-saving features of DUNN'S COUNTERBALANCES. Just as counterbalanced crankshafts add to the efficiency and economy of our best cars, so DUNN'S COUNTERBALANCES give the Ford more power, more speed and decreased gasoline consumption. Vibration in the motor is reduced to a minimum.

POPULAR AMONG FORD OWNERS FOR THREE YEARS

The following letters show what users think about DUNN'S COUNTERBALANCES—

In an actual test on an old Ford, the low gear speed was increased from 15 to 20 miles per hour, and in high gear the speed was increased 10 miles per hour, and this without grinding valves, removing carbon or tuning up the motor in any way.—Murray Fahnestock (Mechanical Engineer), Pittsburgh, Pa.

Our mechanics installed many sets of Dunn Counterbalances and the work can easily be done in one hour—usually in from forty to forty-five minutes.—Opitz Motor Co., Ford exclusively, Clarinda, Iowa.

Price \$12.00 per set cash or C. O. D. Liberal Discount to dealers. Agents and dealers wanted everywhere. Write us ordering sample set, and ask for our proposition.

DUNN COUNTERBALANCE CO.,

Jno. F. Renfro,
1834 B'dway, N. Y. City.

Dept. 1,

Clarinda, Iowa

Dunn C-B Sales Co., 1220 San
Pedro St., Los Angeles, Cal.

Pays for Itself!

COWIE TESTING EQUIPMENT

For Testing and Repairing All Makes of Automotive Electric Equipment

This equipment will greatly shorten the time on every electrical repair job in your shop. This is not merely a claim—it's a fact, proved by actual experience. That's why it pays for itself in a reasonable time.

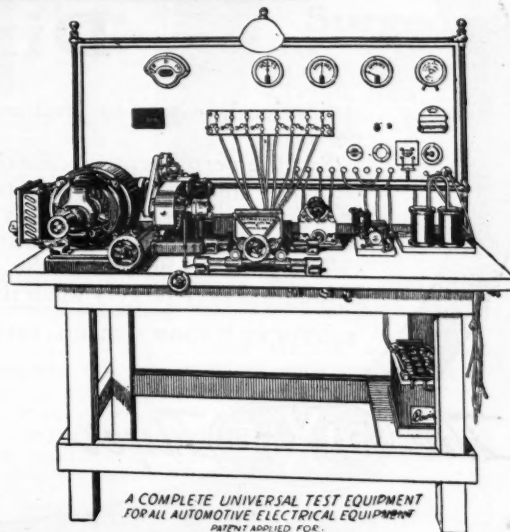
Assures absolute accuracy in testing, under actual working conditions, starting motors, armatures, magnetos, coils, generators, distributors or any parts and units of electrical equipment.

Our new illustrated catalog is now ready for distribution. Write for your copy.

E. S. COWIE ELECTRIC COMPANY

Kansas City, Mo.

Wichita, Kan.



A COMPLETE UNIVERSAL TEST EQUIPMENT
FOR ALL AUTOMOTIVE ELECTRICAL EQUIPMENT
PATENT APPLIED FOR.

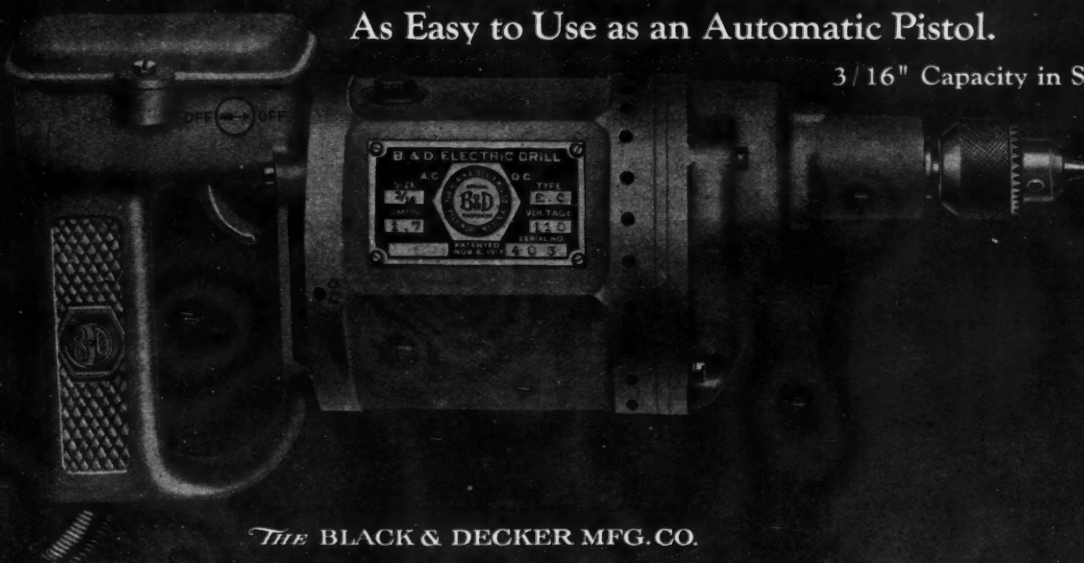
BLACK & DECKER

PORTABLE ELECTRIC DRILL

"With the Pistol and the Trigger Switch"

This is the Black & Decker Baby.
As Easy to Use as an Automatic Pistol.

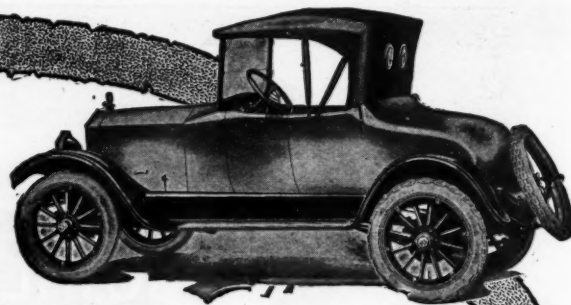
3/16" Capacity in Steel.



THE BLACK & DECKER MFG. CO.

Baltimore, Md., U. S. A.

Portable Electric Drills
Electric Valve Grinders
Electric Air Compressors



Dixie Service

Service is easier to pronounce than to perform.

But the permanent success of any dealer depends almost entirely upon his ability to offer service—service both in car performance and factory cooperation.

The good reputation of the Dixie Flyer is founded very largely upon its invariable

satisfactory performance under all conditions and the generous cooperation of the forty-year-old company back of it in helping the dealer to attain a permanent footing high in the scale of successful selling.

We welcome inquiries from live dealers everywhere who appreciate this brand of "dealer help."

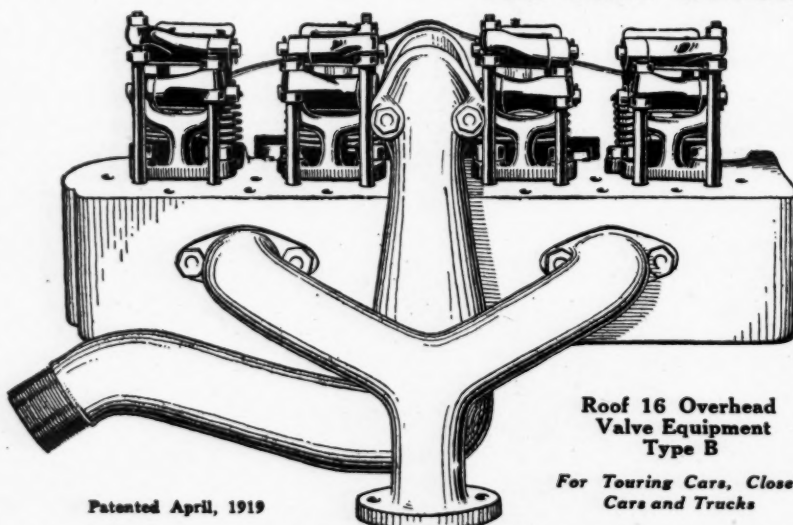
KENTUCKY WAGON MFG. CO., INCORPORATED, THIRD AND G STREETS, LOUISVILLE, KENTUCKY

The **DIXIE** *Flyer*

The **DIXIE** *Flyer*

POWER and SPEED Roof 16 Overhead Valve Equipment

FOR FORD MOTORS



Patented April, 1919

Roof 16 Overhead
Valve Equipment
Type B

For Touring Cars, Closed
Cars and Trucks

Comparison Brake Horse Power Tests at the United States Bureau of Standards gave Standard Ford motor with regulation carburetor 18.7 Horse Power. The same motor with 16 Valve Head and regulation carburetor 22.4 Horse Power. The same motor with 16 Valve Head and Special carburetor 29.7 Horse Power. Recent tests at U. S. Bureau of Standards gave 32 Horse Power. We are Manufacturers and Distributors of speed and other specialties for Ford cars; 8 to 1 gears, high speed camshafts, aluminite, light grey iron pistons, lynite pistons, aluminite connecting-rods, racing spark plugs,

racing carburetors, roller bearings, counterbalances, wire wheels, multiple speed transmission, high tension magnetos, special oiling system, special worm and gear, steering gear, racing tires, racing bodies, hood and radiator, parts for underslinging chassis. Tell us what you want. We can supply it. Racing quality. Lowest prices. Send for our Complete Literature on how to build fast cars and double the value of your converted Ford Truck and descriptive circular on Speed and other Specialties for Fords.

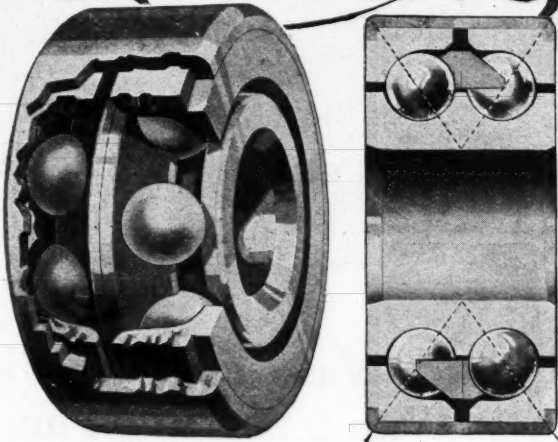
LAUREL MOTORS CORPORATION

Anderson, Indiana, U. S. A.

**The Most Remarkable
Power Device, Even
in This Inventive Age**

Hill Climbing for touring cars—pulling power through sand and mud—doubles the hauling capacity of converted Ford truck-speed for mile and half-mile tracks to rival the fastest cars built. Ford racing cars with our Cylinder Head Equipment and special racing parts have attained speeds from 80 to 100 miles per hour. Price, complete, \$115.00 f. o. b. factory, excise tax paid. Nothing extra to buy. Cylinder Head Equipment all ready for installation. It takes the place of the regular Ford Cylinder Head. Any mechanic can easily and quickly install it.

Quality



The DOUBLE ROW Type.

HERE, at last, is a bearing for resisting thrust stresses as well as radial loads, which is entirely free from destructive or deterrent effects in either theory or practice.

We have shown how other types of bearings develop tendencies which interfere with the primary function of reducing friction between moving parts.

Due to the angular contact of ball with race, this bearing takes radial loads and thrusts in any combination, and yet the balls always roll freely and in their natural paths. This is because the pressure is always "end-on," perpendicular to the axis of rotation.

No wedging - - no binding - - no cramping.

THE NEW DEPARTURE MFG. CO.,
Bristol, Conn. Detroit, Mich.

462

New Departure Ball Bearings



Save

TIRES LIKE THESE

I Earned \$2200 In Four Months
This is Richard A. Oldham. Mr. Oldham was telegraph operator for the Illinois Central Railroad for twenty years. He is fifty-eight years old. One day he read one of my advertisements and the possibilities of making money in the Auto Tire Surgery Business. In a few weeks he had purchased and installed a Haywood outfit. A short time afterward he wrote us that his income in four months was as much as it had been in 2½ years as telegraph operator.

Be a Tire Surgeon
MAKE \$2,500 TO \$4,000 PER YEAR GIVING NEW LIFE TO OLD TIRES

It is being done—by the wonderful new Haywood method of Tire Surgery. It is one of the great results of the war. A Haywood Tire Surgeon can do more with old tires than was even dreamed of before the war. By the Haywood Method a Haywood

Tire Surgeon can give 4,000 to 5,000 more miles of new life to a tire, that two years ago would have been thrown on the junk pile. As a surgeon saves human lives by his operations, so by Haywood Tire Surgery, you can save and lengthen the life of old tires. And it's easy to learn.

HAYWOOD'S TIRE SURGERY

Stations Are Needed Everywhere

20,000,000 tires wearing down every day. By Tire Surgery, you can quickly repair, rebuild and give new life to tires seemingly all worn out. Cuts, gashes, tears, bruises, broken fabrics, every kind of an accident that can happen to any tire, inside or out, you can repair and save for long service. The chance to make money is simply wonderful.

\$2,500 to \$4,000 A YEAR is possible

During the war the nation needed an unusual service to keep the thousands of automobiles, ambulances and aeroplanes going day and night. Haywood Tire Surgery met the demand.

If we told you all the truth you wouldn't believe it. You would say, "It is too good to be true." But you can see what a great field there is for Haywood Tire Surgery Stations—for this better way. You have eyes. You see why there must be wonderful chances to make money. But to see—to know is not enough.

It is action—decision—that counts in these days. The man who waits, gets lost in the shuffle. It is the resolute will to follow your hunch that lands you where the money is.

Send Today for My Free Book
I have ready to mail you the day I get your request, a fascinating book—all about tires—how to repair them by the Haywood Method—how to start in business—how to build up trade—what to charge. "You needn't write a letter—just tear out the coupon right now, fill it in and mail. In 48 to 72 hours you can have the whole proposition right in front of you. It's a case of walking right into \$2500 to \$4000 a year and up. Use coupon at the left.

M. HAYWOOD, President

Haywood
Tire
& Equipment Co.

M. HAYWOOD, President
Haywood Tire & Equipment Co.
500 Capitol Ave., Indianapolis, Ind.

DEAR SIR: Please send me by return mail your free book on the new Haywood Tire Surgery Method and the details of your free school of tire repairing.

Name
Address



500 Capitol
Avenue
Indianapolis
Ind.

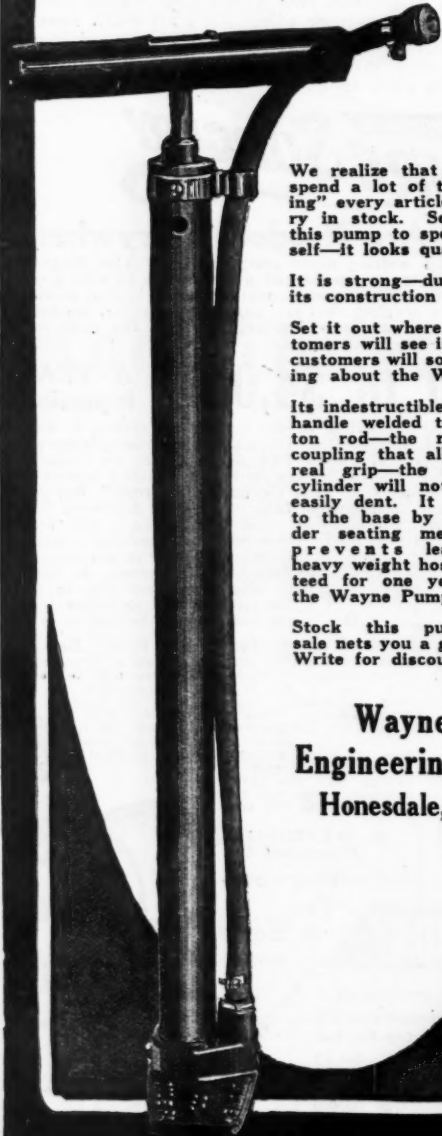
WITH THIS
HAYWOOD OUTFIT

Strength



WAYNE TYPE "B"

Hand Pump Sells Easier



We realize that you can't spend a lot of time "talking" every article you carry in stock. So we built this pump to speak for itself—it looks quality.

It is strong—durable, and its construction is simple.

Set it out where your customers will see it and your customers will soon be asking about the Wayne.

Its indestructible steel tube handle welded to the piston rod—the man's size coupling that allows for a real grip—the steel tube cylinder will not rust nor easily dent. It is secured to the base by the shoulder seating method that prevents leakage—the heavy weight hose, guaranteed for one year, makes the Wayne Pump supreme.

Stock this pump—every sale nets you a good profit. Write for discounts.

**Wayne
Engineering Co.**
Honesdale, Pa.



Don't Waste Time With a Separate Flux

Use solder with the flux right in it. Every drop automatically carries flux with it when you use—

Kester Acid-Core Wire Solder

Its core consists of pockets filled with flux, which flows out when solder is melted off.

IDEAL AUTOMOBILE SOLDER

It is just the thing for automobile repair work. Saves time hunting and preparing a separate flux and is handy when working in tight places.

*Ask your jobber for it or write us
for free sample*

It is sold in cartons containing one pound coils and on one five and ten pound spools.

See Your Jobber Today!

CHICAGO SOLDER COMPANY

Manufacturers
218 No. Union Ave. CHICAGO

Pacific Coast Distributors
**SIERRA
ELECTRIC CO.,**
San Francisco,
Cal.



ITALY



The Bay of Naples

And now the
KISSEL
Custom Built
Six

has as standard equipment
Genuine
Pantasote
Top Material

The wisdom of their choice is confirmed by the past experience of acknowledged leaders in high grade motor-car building whose cars using Pantasote include

PIERCE ARROW	WHITE
PAIGE LINWOOD	COLE
SCRIPPS BOOTH	REO SIX
MERCER	CADILLAC
COLUMBIA	PREMIER
LOCOMOBILE	HUDSON
CHALMERS	

Cheaper materials of similar appearance are frequently represented as Pantasote. Look for PANTASOTE label inside the top—it protects you against substitution which is not uncommon.

The Pantasote Company
 Bowling Green Building
 New York

Restful Comfort and Satisfaction

are the natural results when automobile cushions and upholstery are equipped with Wilson's Woven Curled Hair.

The millions of tough, resilient little hair spirals offer just the right degree of resistance to give the proper springiness and life so much sought after in ultra-luxurious upholstery — and they last a lifetime.

WILSON

Woven

Curled Hair Pads

for fine automobile upholstery

Made by an exclusive, patented process which firmly weaves the sterilized curled hair onto burlap, forming a perfect shock absorbing cushion which will not shift, mat down or get bunched.

This cushion is cut to any size ordered.

Send us blue prints of seats and backs stating your requirements, and we will submit samples and prices.

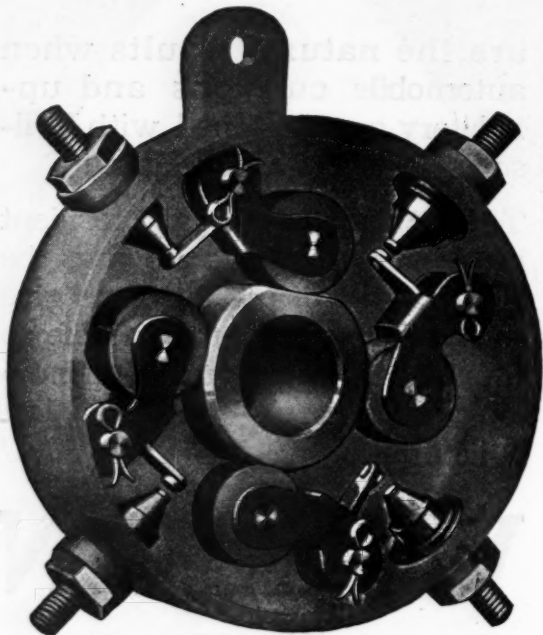
Write for our Free Booklet—"Comfort in Upholstery." Address Dept. MA9

"This
mark

WILSON & CO.
CHICAGO

your
guarantee"

Twice the Life of the Ordinary Timer



DUNTLEY MAGNETO BREAK TIMER

That's what you get from the Duntley Magneto Break Timer—50,000 miles of perfect ignition, with every timer trouble eliminated.

The Duntley is the most economical and nearest perfect timer ever made for Ford Car or Fordson Tractor. Here is what one man says—"The timer you sent . . . is all you claim for it. It certainly gives the Tractor twice the power it had before and also is a saver of fuel."

The Duntley requires no lubrication. There are no sliding contacts. The positive make and break contact overcomes starting troubles, and insures correct timing on all four cylinders. Interchangeable on regular Ford Fittings.

**SOLD ON AN ABSOLUTE
MONEY-BACK GUARANTEE**

Dealers: We have a mighty interesting proposition for you. Write for it.

J. W. DUNTLEY

1004 Michigan Ave. CHICAGO, U. S. A.

BATTERY CHARGING PAYS BIG PROFITS

Fall and Winter are Biggest Money-Makers

You can have from \$100 to \$350 profit monthly from charging batteries, in connection with your present business, by establishing a battery service recharging station. Users of HB Charging Equipment are earning big profits every month with almost no extra effort.

Practically every car today is equipped with storage batteries, which require recharging outside the car at least every two months. Ford cars are now being equipped with electrical starters and storage batteries. Now is the time to get into this work. Build up a profitable and ever-growing business.

You can readily handle a battery charging business, as no special electrical or mechanical knowledge is required. You can get an HB Charger in any size to suit your requirements, insuring maximum profits for you, whether the outfit is large or small.

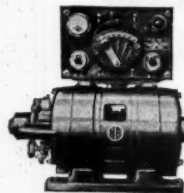
An HB Battery Charger for Every Size Business

All HB Chargers are sturdy, dependable and absolutely reliable. Built of practically wearproof materials. Nothing to burn out no expensive renewals or repairs. Plain, honest, profit-producing service 24 hours a day. No electrical or mechanical knowledge required to install or operate. No attention except occasional oiling. Uses power from your lighting lines. Big, quick, clean profits, easily made!

Choose the Size You Need:

HB 500-Watt Charger

Recharges 1 to 8 6-volt batteries or their equivalent at a time. Charger is 27 in. long, 26 in. high, weighs 280 lbs. Furnished complete with clear black electrical slate switchboard, with mountings of ammeter, field rheostat, voltage, lamp, two controlling switches. A big money-maker for a small battery business.



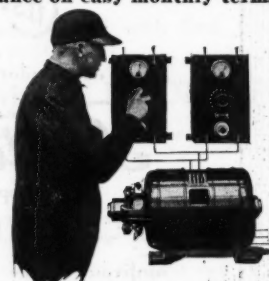
\$15 Cash

Balance on easy monthly terms

HB 16-Battery Charger

Recharges 1 to 16 6-volt batteries at once or their equivalent in 12 or 24-volt batteries. Motor 1 KW capacity. Operates on 2 or 3 phase current only. Furnished complete with 2 independent charging panels each with capacity of 8 batteries. A splendid machine for any live, energetic garage owner wishing to get big profits.

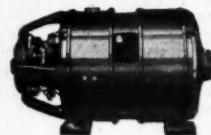
Small cash payment
Balance on easy
monthly terms



HB 32-Battery Charger

Recharges 1 to 32 6-volt batteries or equivalent at a time. Motor 2 KW capacity. Operates on any current. Four separate charging lines, each capable of charging up to 8 batteries. Permits individual attention to batteries on charge. Ideal equipment for big garage or battery service station. Will make as high as \$250 to \$450 a mo. Clear Profit.

Small cash payment
Balance on easy monthly
terms



Sold on Trial Under HB Absolutely Money-Back Guarantee

All HB Equipment is sold under our absolute guarantee of complete satisfaction. You run no risk. If not satisfied after using any HB Equipment 10 days, you may return it and receive all you pay us. The HB monthly payment plan is an additional guarantee.

Select the Charger You Need. Check the Coupon Below. Do it Now! Mark on this coupon the HB Charger you are interested in. Tear it out and mail TODAY. This is your BIG CHANCE. Let us help you start your own money-making business. Be the first in your town to have an HB Charger. Don't delay. Act now.

TEAR OFF HERE

Hobart Bros. Co., Box A93, Troy, Ohio
Send me information about the HB Equipment checked below, and tell me about the HB Money-Back Guarantee and Trial plan.

...HB 8-Battery Charger ...HB Belted Charger
...HB 16-Battery Charger (Used where electric cur-
...HB 32-Battery Charger rent is not available.)

Your Name

AddressState



4 IN 1 AUTO INDICATOR

Prevents Accidents Like This

Why takes chances? Accidents are expensive. Why ask the fellow behind you to guess—when so important a matter as a collision or even loss of life is at stake?

The AUTO INDICATOR SAFETY SIGNAL informs instantly. It is a complete combination of signals. FOUR-IN-ONE, positively preventing accidents, indicating right and left turn, "STOP" and "GO," as needed. It is simplicity itself in construction, automatically controlled, easy to operate, requiring no thought, attractive in appearance, effective in action, not expensive and no expense for up-keep.

The FOUR-IN-ONE gives absolute protection.

The AUTO INDICATOR is not electrical except in-so-far as any ordinary tail light is, having an electrical bulb and socket. The device is 8 in. by 4 ft. and can be attached to the fender or in any other position on the rear of the car as is made necessary by the location of the gas filler cap or by existing legislation. An important feature of this device is that it demands attention owing to the fact that at night the color changes from red to white in changing from the word "GO" to "STOP." This device functions properly under any and all braking conditions. It works just as surely if the brake is applied lightly to simply slow the car down as it does if the brake is engaged to the limit to stop the car suddenly.

The AUTO INDICATOR can be installed by anyone on any car in less than two hours. It positively cannot interfere with the action of the brakes in any way.

This is the one device which motorists welcome. It is the device which they buy and appreciate.

JOBBERS—the demand is unlimited.

DEALERS—the price is just right to interest the many car owners in your territory.

**Excellent territory open for
STATE REPRESENTATIVES**

Pacific Coast Representatives

THE NORMAN COWAN CO.

San Francisco,

California.

AUTO INDICATOR CO.
Grand Rapids, Mich.



Price \$15 Complete



"If There Were a Better Battery I'd Have It—"

"and I'd want every one of my customers to have one. Standing between them and all battery worry is what I'm here for.

"Our Service Men are efficiently trained to inspect for symptoms of wear, add distilled water and take hydrometer tests. You see Prest-O-Lite is the oldest service to motorists in America.

Here are 10 Good Reasons for Prest-O-Lite Supremacy:—

"First off, the Plates—a new process adds strength and life to the battery. An extremely porous surface insures a larger volume of current with less internal heat and no injurious chemical action.

"Then the Separators—so porous you're bound to get maximum circulation and no internal short circuits.

"Third—Look at the high bridges for plate support. They give plenty of room for sediment and reinforce the hard rubber jars.

"Next look at these rugged Plate Connectors. They insure maximum electrical conductivity and great strength.

"Fifth and mighty important, the Hard Rubber Jars and Covers undergo a test of 20,000 volts. Reinforced to stand the big strains.

"Here's an exclusive feature Patented Post Construction—eliminates acid creepage and slopping, the chief causes of corrosion.

"Advantage No. 7 is a sealing compound which won't crack in cold weather or soften in summer and eighth is ease in inspecting and filling.

"Highest terminal voltage in discharge is an important factor. Terminals and Cell Connectors are sufficiently large to carry the highest rates.

"And to hold the 'works' together there's a selected hardwood box built for roughest service."

No Wonder It's the Fastest Growing Battery Business in the World

The Prest-O-Lite Company, Inc., General Offices
30 East 42d Street, New York
Kohl Building, San Francisco

In Canada:
Prest-O-Lite Co. of Canada, Ltd., Toronto



The Oldest Service to Automobile Owners in America

Look for the name Prest-O-Lite on Service Station Signs Everywhere

TRIPLEXD

The Guaranteed Hose

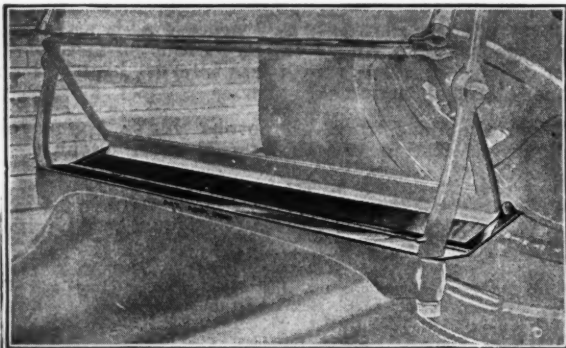
"This Triple Xd Hose is Guaranteed to Last a Full Year"

YOU are guaranteed at least one year's service* from every length of TRIPLEXD you buy. With no other gasoline hose at any price are you sure of this. When you specify TRIPLEXD—we see you get the service you pay for.

METAL HOSE & TUBING CO.
INCORPORATED
235 Tillary St.
BROOKLYN, N. Y.

The Triple X construction makes possible the TRIPLEXD guarantee. Three plies—metal, fabric and rubber—bound into one.

*The average service life of TRIPLEXD Hose is over two years.



No Bugs or Insects When Driving

This patented device attached to your windshield in 10 minutes without disfiguring car. Wrench only tool necessary. Insures cool ventilated car—comfort and elimination of bugs and insects.

"MAC" COMFORT SCREEN

Opens and closes instantly. Will not rattle or rust. Protects instrument board from rain. A good looking accessory.

**PRICE \$10.00 F. O. B. FACTORY
IMMEDIATE DELIVERIES MADE**

For Buick models D, E, H, and K, Dodge, and Oakland 1919-1920 models. Give frame number when ordering for Dodge. We also solicit orders for "Mac" Comfort Screens for other makes of cars. Crated and shipped to you direct.

Write for Booklets

Sold by
MAC COMFORT SCREEN COMPANY
Box 513 Louisville, Ky.

MFG. BY
THE HIGGIN MFG. CO.
Newport, Ky.

Send Us Your SCORED CYLINDERS

and cracked water jackets. Our factory nearest you will make these repairs on a 24-hour service basis.

Regrinding of cylinders that have been scored by wrist pins or through other causes is unnecessary. The Lawrence Patent Process fuses a silver-nickel alloy into the defects making a quick, clean, permanent job without altering the bore of the cylinder. Same piston and rings fit.

Cracked water jackets are also made permanently good through this same process.

A list of our factories is given below. There is one near you. Send the scored cylinders and cracked water jackets to the nearest plant. There we will insure you quick service and perfect results. Aside from the liberal arrangements we make with you, the money saving service you render your customers will help make you known as a concern that looks after their interests—and this is a business asset in itself.

Write to any of our factories for full information.

L. LAWRENCE & CO. Woolworth Bldg.
New York

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Cleveland, 6259 Euclid Ave.
Detroit, 1246 Jefferson Ave.
Los Angeles, 335 Washington St.
Milwaukee, 18-26 Martin St.

Minneapolis, 14-16 N. 9th St.
Newark, N. J., 292 Halsey St.
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Philadelphia, 1801 Summer St.
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Kansas City, Kans., General Auto Parts Co., Grand Ave.
Lima, O., Buckeye Repair Shop, 135 Water St.
Memphis, J. B. Cook Machine Shop, 294 Washington St.
Providence, R. I., Liberty Manufacturing Co., 15 Pine St.

Established 1862

A Few Territories Still Open for Licensees

LAWRENCE

PATENT

PROCESS

SCORED CYLINDERS AND SAND-FAULTS CORRECTED

TRADE MARK

MORE PRECISION MAINTAINED
CYLINDER SCRAPPING ABOLISHED

KNEUTOP PUTS NEW LIFE INTO OLD TOPS



The best \$1.25 you ever spent. One Quart will waterproof your top, and give the original sheen to Mohair.

For Leather and Imitation Leather it waterproofs and gives the original gloss and flexibility to the top.

PROTECT YOUR TOP

For Winter Driving
Easy to apply
Full directions on every can of KNEUTOP

Sent in mailable containers
\$3.25 per gal. \$1.75 per half-gal.
\$1.25 per qt.

Manufactured only by

The Western Reserve Varnish Co.
1251 Marquette St. Cleveland, Ohio



"Just What I Want"

Everyone says so at a glance, and when once installed in your Garage or Shop you would as soon think of keeping your front doors perpetually locked as doing without an

Automatic Extension Reel

For Electric Lamps

Take your lamp to any part of your Garage or Shop, locking and unlocking at any desired point. Automatically rewinds the cord when you are through with the light.

STRONG AND DURABLE. Send for full particulars and prices. Remember that it is not in any way a "half-baked" proposition nor an amateur outfit, but a splendidly constructed and practical piece of mechanism for men who haven't got time to bother with nonsensical makeshifts. Equipped with 25 feet packinghouse cord, handle, socket and lamp guard.

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OLD SOL SPOTLIGHTS



OLD SOL
No 76
WING NUT
REMOVE FOR
TROUBLE LAMP

"OLD SOL"

No. 76 Liberty Searchlight. Price \$5.50

Combined Push Button switch and focusing control in handle. Wing nut on bracket for inspection lamp. Double clamp bracket. Duplex wire to battery.

Three-inch mirror integral with lamp body, extra large silver plated reflector. Special high candle power bulb. Black enamel finish only.

Diameter of lamp front, 7". Weight, packed in 9 3/4 x 6 3/4 x 6 3/4 carton, 4 lbs.

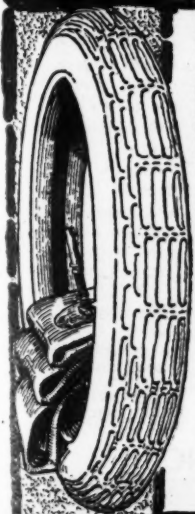
Made and Distributed by

THE HAWTHORNE CO.

Grassmere Avenue

BRIDGEPORT, CONN.

TIRES FOR ECONOMY MOTORISTS TUBES



Slightly used and repaired tires and new tubes of the best known standard makes that mean big cash savings for every car owner.

Size	Tires New Tubes	Size	Tires New Tubes
30x3	5.00 1.70	34x4	8.75 2.80
30x3 1/2	6.00 2.10	34x4 1/2	9.25 3.15
32x3 1/2	6.50 2.25	35x4 1/2	9.50 3.25
31x4	7.25 2.50	36x4 1/2	9.75 3.30
32x4	8.00 2.60	35x5	10.50 3.65
33x4	8.75 2.70	37x5	11.00 3.75

For Non-skids add 10% to above prices

COMPLETE STOCK of NEW TIRES

Write for Prices

Terms: \$1.00 deposit with each tire ordered, balance C. O. D. subject to inspection. Specify style of rim to avoid delay. Although at the above prices these tires bear no mileage guarantee, we will make reasonable adjustments should they prove unsatisfactory. All tires sent in for adjustment must be prepaid.

Special Proposition to Live Dealers

TIRE REPAIR & SUPPLY CO.

Dept. A, 1429 Michigan Ave., Chicago, Ill.
Phone Calumet 47-48-49

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AN illustrated guide to points of interest in and around Buffalo and Niagara Falls. Free on request.

When in Buffalo, stop at the Hotel Lenox—Buffalo's ideal hotel for motorists. Quietly situated, yet convenient to theater, shopping and business districts and Niagara Falls Boulevard. First-class garage.

European plan. Fire-proof, modern. Unusual cuisine. Every room an outside room.

\$2.00 up.

On Empire Tours, Road map and running directions free.

C. A. MINER

Managing Director,

North St. at Delaware Av., Buffalo, N. Y.



HOTEL LENOX



**PACO—The Distinctive Body
1919 Exclusive Points**

PACO BODIES are back again. They have returned with new features after their withdrawal from sale while all of the nation's steel was being used against the Hun.

Make a snappy, fast and comfortable roadster out of the old Ford by putting on a PACO BODY. Modeled after world's greatest speedcars—long, sloping hood—streamline cowl—low seats and receding rear end—PACO BODIES offer least wind resistance. Designed on scientific engineering lines for speed and comfort.

FREE!! Write Today
3-color circular with illustrations and actual photographs of PACO BODIES mailed on request. Send for illustrations and prices of PACO BODIES. Do this today—get full description of these classy racing bodies.

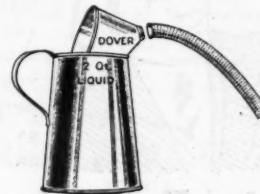
PACO BODIES ARE EXCLUSIVE. We are patentees, sole owners and sole manufacturers of this type of racing body. All designs are fully covered by U. S. Patents granted Jan. 23rd and March 13th, 1917.

See the 1919 PACOS with the new Sport Top and Windshield, PACO exhaust, disk wheels and other features. Send for the FREE Circular. Order an exclusive—distinctive—PACO BODY.

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NEW DOVER Flexo Combination Measure and Funnel

Heavily Copper Plated



Made in 1, 2 and 4-Qt. Sizes

A measure and funnel combined with 8" detachable flexible spout. Easily reach any oil hole or tank without spilling. Send for Catalog

Dover Stamping & Mfg. Co.

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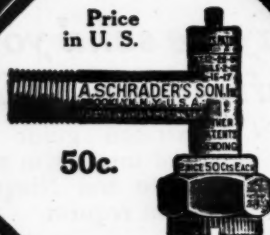
Cambridge, Mass.,

U. S. A.



Is Your
Tire
Pump
Complete

Price
in U. S.



50c.

With a

SCHRADER UNIVERSAL PUMP CONNECTION

attached to your tire pump you are saved the labor of pumping your tires up beyond the required pressure. It permits the measuring of the inflation without disconnecting the pump and the tire.

A. SCHRADER'S SON, Inc.

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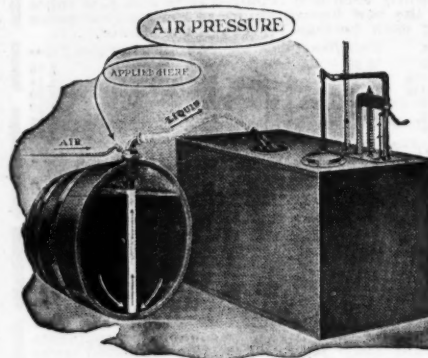
A Real Labor Saver

Empties a Barrel of Oil in 3 Minutes, Without Pumping or Any Work Whatever

Air Pressure Does it All—You just roll the barrel up to the tank and connect the

OPTIMO

Barrel Discharging Bung



It will prove itself worth many times its price—\$10 complete with 24" length of flexible metal conveyor tubing—

**GUARAN-
TEED**

on a "Money Back" Basis to do all we claim for it

**ORDER
TODAY**

No Labor, No Waste, No Slopping

L. A. MORGAN CO., INC.

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All infringements of patent rights and users of such device will be prosecuted.



This Will Do It Quickly!

Those dirty, uneven, pocked and poorly seated valves that have been eating up your power and causing unlimited trouble, can be reground in half the time at half the cost by using



S. & P. BRAND VALVE GRINDING COMPOUND

The remarkable abrasive properties make quick work possible; save time, labor and expense; and the job when finished is most satisfactory.

Used by the largest Service Stations in New York and sold by jobbers everywhere. Comes in 5 oz. Duplex cans at 45c. per can and in one-pound cans for factory use.

SEND FOR FREE TRIAL CAN

S. & P. Manufacturing Co.

163 Columbus Ave., New York

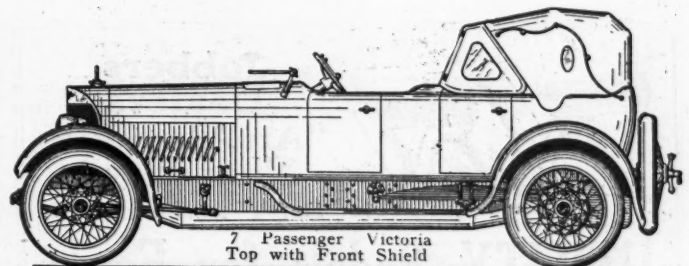
Boko
FOLDING STEEL STOOLS

Dealers—Big Profits on a Small Investment

You can make good money selling BOKO Folding Steel Stools. They sell on sight and the profits are really worth while. The BOKO Folding Steel Stool is an ideal extra seat—a seat which provides comfort no matter how long the trip is. BOKO buckets, likewise, are most useful devices and offer unlimited sales opportunities.

Send for illustrated literature and full details TODAY.

Sales Dept. The Bailey-Drake Co., Inc.
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Unexcelled in superb finish and skilled workmanship.

A motor car distinguished from all others in design throughout. A pleasure vehicle for those who discriminate and demand distinctiveness.

We specialize in individual design.

Open models \$5000.00; closed models \$7200.00 and up.

Agency inquiries given prompt consideration.

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JORGENSEN VAPOR PRIMER

It Vaporizes the Starting Charge

Universally accepted the standard primer for motor trucks, tractors, passenger cars, airplanes and motor boats. The most perfectly constructed and most efficient primer on the market.

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JORGENSEN MFG. COMPANY
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FOUR-WHEEL-DRIVE

This sturdy, successful tractor embodies many unusual features. It is making money for both dealers and users. Three models:

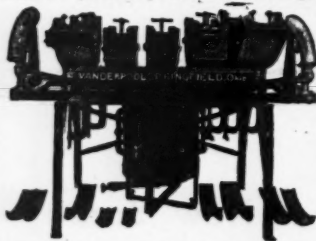
15-24, \$1765 20-28, \$2800 35-50, \$4000

Investigate—Act Today

CHICAGO NELSON CORPORATION BOSTON
 SUBSIDIARY COMPANIES
 Nelson Blower & Furnace Co. Nelson Machine Co.

ENORMOUS INCOME FROM INSIGNIFICANT INVESTMENT

Open a Tire Repairing Shop—business pours in. Vanderpool Vulcanizer (5 Cavity Model) has capacity of \$100 worth of work a day. We are the pioneer manufacturers of the Dry Cure Vulcanizer—the only vulcanizer that guarantees absolutely PERFECT work. We send you FREE TIRE REPAIRING MANUAL and give you free instruction. Write today for full particulars.



WM. VANDERPOOL CO.

In answering, address
 Dept. P-15

Springfield, O.

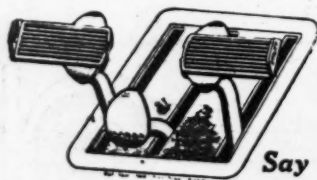


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NON-FLUID OIL
 UNITED STATES PATENT OFFICE

CAUTION!

Insist on Genuine Non-Fluid Oil in Orange-colored cans with the sprocket wheel trademark.

"K000" For Bearings — "K00 Special" for Gears
 in orange cans — at all dealers
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 "An Absolute
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Say Users Referring to

UTILITY Pedals for Fords

UTILITY Pedals are the most necessary accessories for Ford Cars. Users say so, and they sell in proportion to this demand.

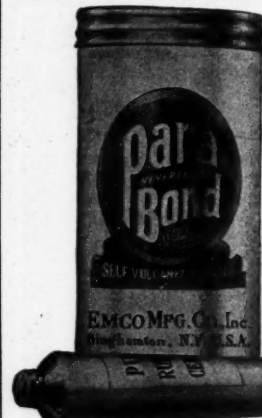
*Dealers—order from your jobbers.
 Jobbers—get in touch with us.*

HILL PUMP VALVE COMPANY
 Mfrs. of UTILITY Products

Archer Ave. and Canal St., Chicago, Ill.
 Sales Dept., THE ZINKE Co., 1323 S. Michigan Av., Chicago

Price

\$1.25



"IT NEVER LETS GO"

PARA-BOND is the tire patch you are going to use eventually.

Auto owners are fast learning it's the best their money can buy. Jobbers and Dealers make bigger profit with quicker turnover.

Write now for liberal Free Goods Proposition.

EMCO MFG. CO.

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Waukesha 4-CYLINDER MOTORS FOR TRUCKS AND TRACTORS

Are the Product of the World's Largest Organization Devoted to the Building of Truck and Tractor Motors Exclusively.

WAUKESHA MOTOR CO.
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STARTING LIGHTING SYSTEMS

THE DYNETO shows greatest efficiency in both motor and generator. Type D. A. Motor develops a torque of approximately 15 pounds. Type C. A. Generator shows approximately 15 amperes.

A car-speed of 15 to 20 M. P. H. keeps batteries fully charged.

Starter always sure to start.

Lamps always bright. Send drawings and specifications for our recommendation.

Special Outfits for Fords

DYNETO ELECTRIC CORPORATION, Syracuse, N. Y.



The Soap That Cuts Grease

Packed in individual cartons, 100 to the case.



Long experimentation has developed the perfect mechanics soap, the name is

CHAUFFEURS

It instantly removes all grease and grime, the easy scientific and harmless way.

Our slogan

Not "Just as Good" but "THE BEST"

Ask your dealer or send 10c for your first cake.

UNION CHEMICAL COMPANY
Decatur Illinois

NO-BLO BOOT



A Quality Blow Out Patch That SELLS

This patch is made so that it takes the pressure off the injured part of the tire; it is smaller in the center than the inside of the tire actually is, so when the tube is inflated and stretches the patch, it fits the tire and does not put any strain on the injured part of the tire. This patch holds rim cuts as well as blow-outs, as it is full thickness to the locking edges.

The NO-BLO Boot has been tested and found satisfactory by hundreds of users. It is a strictly quality product. Write for our dealer proposition.

Central Auto Accessories Co., Peoria, Ill.

ECLIPSE

BENDIX DRIVE

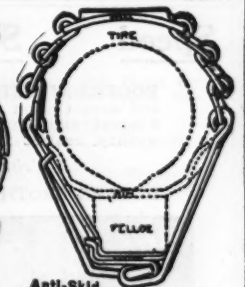
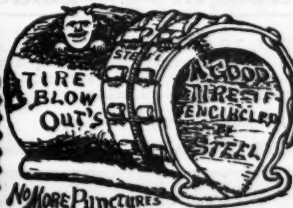
for electric starters
AUTOMATIC ENGAGING AND DISENGAGING

Used by

170 motor car and truck builders



Steel Tires & Mud Chains



Old tires covered Complete

Try 2 or 3 sections over any old blowout. Can't have blowouts, punctures; neither can the rubber wear off.

Anti-Skid Mud chains can be put on in a jiffy with one hand while standing on the running board. Hook the ends together and push the little lever. If you get in a mud hole you will laugh out loud.

Special prices to those in new territory

Kimball Tire Case Co., 173 Broadway. Council Bluffs, Ia.

YOUR OPPORTUNITY

Canceled Government Contracts

We have secured a large quantity of Small Motors, Generators and Charging Outlets. This material is new, still in original cases and carries the full factory guarantee. This is Your Opportunity to buy new, guaranteed Electrical Apparatus of Standard Manufacture



Battery Charging Outlets

For use on 110 volt, A. C., 60 cycle, single phase current only

50 watts, 8 volts, 10 amperes \$48.50

100 watts, 30 volts, 10 amperes \$68.50

150 watts, 15 volts, 10 amperes \$68.50

200 watts, 20 volts, 10 amperes \$94.50

All outlets complete with switch-board as set above.



Small P.M. and H.P. Motors

subject to full examination. MONEY BACK Guarantee

Respectfully to Motorists Everywhere

Write for Catalogue



NEW MOTORS

MANUFACTURED BY WEST END

1/2 H. P. INDUCTION MOTOR 110 or 220 volts, A. C., 60 cycle, single phase, 1750 R. P. M. \$32.50

ALL MOTORS COMPLETE AS CUT

1/4 H. P. 110 volts, A. C., 60 cycle, single phase, 1750 R. P. M. \$18.50

WASHING MACHINE MOTOR

Suitable for operating Small Compressors, Coffee Grinders, Battle Washers, Lathes, Drill Presses, etc.

110-220 volt, 1/2 Hp. \$44.50 1Hp. \$67.50

REPLUSION MOTORS 110-220 volt, 1/2 Hp. \$44.50 1Hp. \$67.50

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Make Your Ford Ride Like a Packard or Pierce Arrow with a

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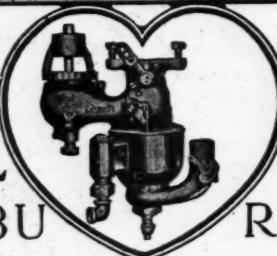
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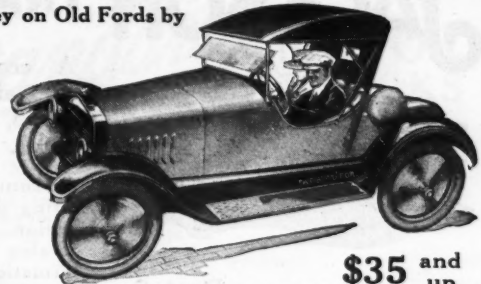
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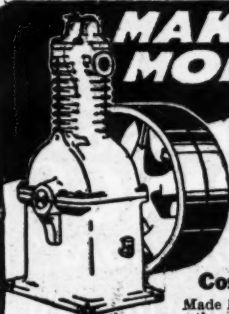
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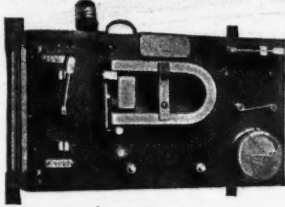
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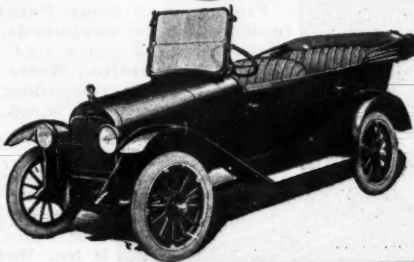
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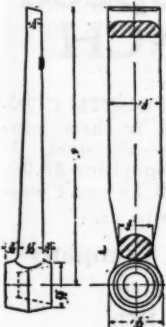
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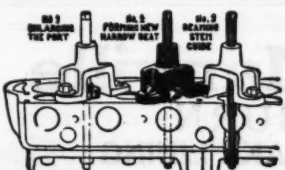
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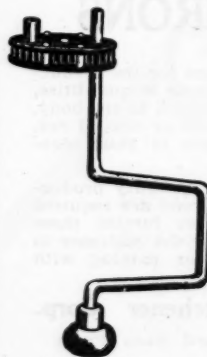
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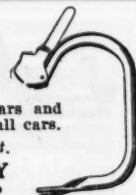
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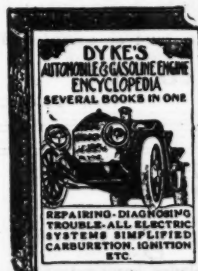


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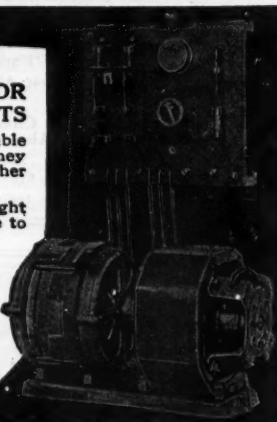
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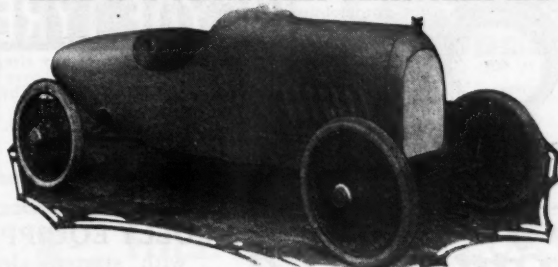
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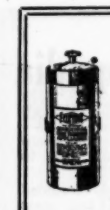
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The Aerodyn Valve will save 25% of gas on the same mileage and increase the power of your motor up to 20%. If it don't do it to your satisfaction, send it back and get your money—you're the judge. Installed in fifteen minutes—costs but \$4.50.
Dealers write for trade proposition.
STANDARD AUTO MFG. CO.
814 E. Genesee St. Syracuse, N. Y.

Akron-Williams TIRE REPAIR EQUIPMENT

Preferred and used by the largest tire factories in America. Consult us before remodeling or increasing your facilities.

THE WILLIAMS FOUNDRY & MACHINE CO.

Everything in Tire-Repair Machinery and Tools. Akron, Ohio



GILLETTE TIRES & TUBES

Products of the Improved Gillette Chilled Rubber Process. Refining treatment that toughens rubber as iron is toughened by conversion into steel. Not affected by climatic conditions. Greatest mileage economy ever attained.

GILLETTE RUBBER COMPANY

General Sales Office: New York City, N. Y.
1834 Broadway
Factory: Eau Claire, Wis.

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U. S. BALL BEARING MFG. CO.

(Conrad Patent Licensee)

Palmer Street and Kolmar Ave. Chicago, Ill.

Cletrac TANK-TYPE TRACTOR

Offers an almost unlimited opportunity for dealers

Write for catalog and dealer proposition

The Cleveland Tractor Co., Cleveland, O., U. S. A.



Standard Power
for
Automobiles
and Trucks

Continental Motors

Detroit, Mich.

DISTRIBUTORS WANTED FOR

Guaranteed
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of the car

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HYDRAULIC GEAR SHIFT

EVERYONE
WANTS
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U. S. AUTO GEAR SHIFT CO., 122 S. Michigan Ave., Chicago



GREB AUTOMATIC GRIP PULLER

BENCH PATENT

There's no chance of this long-armed tool slipping—it grips the work like a vise, adjusting instantly—locking tight. Greb Arbor Press Base and Bench Plate attachment for Senior Puller gives you \$110 equipment for less than one-third that amount. Dealers and Jobbers—Write for our liberal discounts and 10 days' trial proposition.

THE GREB CO., 305 State Street, Boston, Mass.



Should be regular equipment on YOUR CAR

KELLOGG
ENGINE DRIVEN
Tire Pump

KELLOGG
MANUFACTURING
CO.

ROCHESTER
NEW YORK

TRED-WEL LAST-WEL TIRES TUBES

If your trade is showing dissatisfaction with the tire you are selling and if you would like a better selling plan than you have, write to us. We have an attractive proposition on a moderate priced tire.

1002 Michigan Ave. **TWIN RUBBER** Chicago, U. S. A.



HILL 3-A SPARK PLUGS

Dealers—You sell them on our guarantee that they cannot leak compression—short circuit, develop carbon, rust or break. This covers every good point a spark plug can have. Sell them and you sell satisfaction at a good round return for yourself. Price \$1.25 each. Write for the big story.

Hill Spark Plugs Make Good—or we do.

HILL INSULATING & MANUFACTURING CORP., 515 W. 42nd St., N. Y. City



COE-STAPLEY

**Whirlwind
Tire Pump**

Your customers cannot afford less efficient accessories. To serve their best interest sell the Whirlwind Pump and Peteler Jack

**Peteler
AUTO JACK**

COE-STAPLEY MANUFACTURING CORP.

Sales Office, 136 Liberty St., New York.

Factories: Bridgeport, Conn.



STANDARD RADIATOR

Make big money selling this 2½ in. brass core radiator. Interchangeable with regular Ford, fits Ford shell. Retail Price complete \$21.00. Less shell \$19.50.

STANDARD RADIATOR CO., Inc.
SPRINGVILLE, NEW YORK

A Few Live Dealers Wanted for

MUTUAL

"America's Greatest Truck"

2-3½ and 5-ton, with Electric Light, Enclosed Cab, and Metal Wheels as part of regular equipment.

MUTUAL TRUCK CO.

Sullivan, Ind.

BRISCOE

"Before you decide take a Briscoe ride" has become almost a rule among buyers of popular-priced cars.

BRISCOE MOTOR CORPORATION, Jackson Michigan
The Canadian Briscoe Motor Co., Limited, Brockville, Ontario

THE ORIGINAL PITTSBURGH VISIBLE SPARK PLUG



You can see and detect ignition trouble. Spark gap, which is adjustable, also acts as an intensifier and prohibits carbon. This plug cannot short circuit leak compression and is practically unbreakable. More real selling points than others offer. Get our liberal dealer proposition. **WE PAY THE WAR TAX.**

PITTSBURGH VISIBLE SPARK PLUG & MFG. CO.
Pittsburgh, Pa.

The Motor Truck bought today without Electric Starting and Lighting will be out of date to-morrow

BETHLEHEM
Internal Gear Drive
MOTOR TRUCKS
Dependable Delivery

BETHLEHEM MOTORS CORP. ALLENTOWN, PA.

The Motor Truck bought today without Electric Starting and Lighting will be out of date to-morrow

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DUAL FUEL CARBURETOR

RUNS THE FORD ON KEROSENE

Dealers—Here is a new big seller with liberal profits that lead to more. Write for free literature and details.
WESTERN CARBURETOR CO. Alma, Michigan

L. A. Young Industries, Inc.

Portable Power Implements
for the Farm

Detroit
Michigan



**GREATER
EFFICIENCY**
**LONGER
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factory rebuilt tires—

There is now developed a widespread demand among motorists for dependable rebuilt tires. The prices interest both tire users and dealers. Send for quotations.

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Two Money Makers

FOR FORD DEALERS AND JOBBERS

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Rolls-Royce Type Radiator
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"Permanently Beautiful"

Better Cooling, Less Trouble, Longer Life. Write for Proposition

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The EMCO

Indestructible Radiator for
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Enormously Popular



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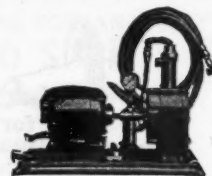
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Established 1876
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The "LongStroke" COMPRESSOR

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Cut Hauling Costs

and speed up deliveries with Watson Trailers. They are producers.
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Installed in front of your garage, the Bowser Curb Pump suggests a new supply of clean, filtered, full-powered gasoline—SERVICE. Install one of these pumps now and secure your share of this Profitable Business. S. F. BOWSER & CO., INC. Fort Wayne, Ind., U. S. A. Branch Offices in 21 Cities of U. S., Canadian Office and Fact., Toronto, Ont.



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Popular Priced Field

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Install General Storage Battery Service

Under our ironclad twelve months guarantee, backed by the factory, the service station man is selling the BEST BATTERY—with solid assurance to rely upon. No adjustment-guarantees to make profits dwindle. A Square Deal to Every Customer.

GENERAL STORAGE BATTERY CO., 2005 Locust St., St. Louis, Mo.
Full Line of Parts For All Makes of Storage Batteries.

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The HUFFMAN TRUCK

\$1495

With Internal
Gear Drive

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The Lowest Priced Truck in America for Its Carrying Capacity

HUFFMAN BROTHERS MOTOR CO.

Main Office and Factory, Elkhart, Ind.
Branch and Show Room 2425 Michigan Ave., Chicago, Ill.



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pasted
plates



THE CLEARING HOUSE OF THE MOTOR INDUSTRY

FOR PARTS, ACCESSORIES, TIRES, MACHINERY, REBUILDING, REPAIRING, WELDING AND USED CARS. ALSO HELP AND SITUATIONS WANTED AND MISCELLANEOUS CLASSIFIED ADVERTISING.

Wire-Write-or Come to Warshawsky— Headquarters for Auto Parts

Every Used Part Is in First Class Condition, and Will Render Satisfactory Service. If We Cannot Satisfy You, Your Money Will Be Cheerfully Refunded

SPECIAL MOTOR BARGAINS

All in Excellent Condition
UNIT POWER PLANTS

1 New Keystone 6 cyl.	\$200.00
New Sunlight 6 with starter and generator	225.00
1 Stearns Knight 4 cyl.	150.00
1 Stoddard Knight 6 cyl.	200.00
3 Hershoff Spillman 6 cyl.	175.00
1 Hershoff Spillman 6 cyl.	150.00
1 Model engine 4 cyl.	125.00
1 Jackson 4 cyl.	150.00
1 Haynes 4 cyl.	125.00
1 Allan 40 4 cyl. with gen.	125.00
2 Continentals 4 cyl. with magneto	175.00
2 Lozier 4 cyl.	100.00
1 Wisconsin Out of Cutting 4 cyl.	100.00
1 Menominee 4 cyl.	100.00
1 Rutenber 4 cyl.	100.00
2 Master 6 Chalmers 6 cyl.	125.00
1 Knox 6 cyl.	175.00
1 Haynes 6 cyl. with starter and generator	175.00
1 Patterson Northway 4 cyl.	125.00

MOTORS—ONLY

1 New Calile 8 cyl. with Starter, gen. and carb.	\$250.00
1 Studebaker 6 cyl.	100.00
1 Hudson 6 cyl. 6-54.	125.00
1 Velie 6 cyl.	125.00
1 Peerless 6 cyl.	125.00
1 Premier 6 cyl.	100.00
1 Pierce 6-38 6 cyl.	120.00
1 Pierce 6-48 6 cyl.	135.00
1 National en-bloc.	135.00
1 Northway 6 from Cole with centre control, starter and generator	150.00
1 Northway 6 from Oldsmobile with starter and generator.	135.00
1 Rutenber 6 cyl.	125.00
1 Continental with starter.	125.00
1 Rutenber 6 out of Auburn.	125.00
50 New Sun 6 cyl.	125.00
2 Mitchell T Head 6 cyl.	125.00
2 Alco 6 1/2 Ton Truck.	150.00
1 Peerless 6 cyl.	150.00
2 Studebaker 4 cyl. 25.	90.00
5 Continental E 4 cyl.	100.00
5 Continental C 4 cyl.	100.00
1 Continental C 4 cyl. with starter	100.00
1 Continental R 4 cyl.	100.00
1 Continental P 4 cyl.	100.00
1 Northway 4 cyl.	85.00
1 1914 Cadillac 4 cyl. with starter and generator.	125.00
1 1913 Cadillac 4 cyl.	100.00
1 1912 Cadillac 4 cyl.	100.00
1 Stoddard Dayton 4 cyl.	100.00
2 Packard 18 4 cyl.	125.00
1 Overland 83 en-bloc.	100.00
2 Overland 69.	85.00
1 Overland 79.	95.00
3 Ford.	75.00
1 Buick Truck.	85.00
1 Atlas.	75.00
1 Blitzen Benz.	100.00
1 Marion Stutz New 4 cyl.	125.00
1 Marion Stutz 4 cyl.	100.00

We Buy
**BOSCH
MAGNETOS**

Hair and Leather in
Any Quantity

10 Buda 4 cyl.	90.00
1 Alco 4 cyl.	75.00
3 Wisconsin 4 cyl.	125.00
2 Mitchell 1913 T Head 4 cyl.	100.00
1 Knox 4 cyl.	100.00
3 Reo 4 cyl.	75.00
1 Staver 4 cyl.	90.00
1 National 4 cyl.	125.00
1 Cadillac Marine 4 cyl.	100.00
1 Commerce 4 cyl.	75.00
1 Renault 4 cyl.	90.00
3 RCH 4 cyl.	60.00
1 Premier 4 cyl.	100.00

MAGNETOS

Overhauled and Guaranteed

New DU4 Variable	\$37.50
DU4 Bosch Set Spark.	25.00
DU4 Bosch Variable Spark.	27.50
DU6 Bosch.	32.50
DR4 Bosch.	20.00
DR4 Bosch 2 spark.	25.00
DR6 Bosch.	25.00
DR6 Bosch 2 spark.	25.00
D4 Bosch.	15.00
D6 Bosch.	17.50
D6 Bosch 2 spark.	\$45.00

New Sims H. T.	22.50
NU4 Bosch.	15.00
ZR6 Bosch.	50.00
ZR4 Bosch 2 spark.	100.00
Eisemann Dual.	15.00
Remy Model RL & D.	7.00
Dixie Magn.	12.00
New Dixie Magn. 4 cyl.	18.00
Sims H. T.	12.00
New Sims H. T.	18.00
Mea.	12.00
New Splittorf Type E.	12.00

COILS

Bosch Type A.	\$7.50
Bosch Duplex.	4.00
Eisemann.	4.00
Splittorf.	4.00
Silent Starter and Generator Chains; all lengths and sizes.	

New 8-cyl. Delco distributors. 12.00

MOTOR GENERATORS

Remy 5, 6, 3.	\$35.00
Disco 16 E-12 volt.	35.00
Apple, Mod 28 A.	25.00
Intz Chalmers.	35.00
Northeast.	20.00
Apple-A28 for Mitchell.	25.00
Wagner 13 Studebaker.	25.00
Remy S J 2.	35.00
Remy No. 535.	35.00
Jesco.	25.00
20 Delco.	30.00
Gray & Davis 2 Unit.	35.00
Westinghouse S W 1158 A.	30.00
New Remy Model 150B 6 volt Starter and Generator.	60.00

GENERATORS

Gray Davis G. G. I. C.	\$15.00
Ward Leonard AG T.	10.00-12.00
Splittorf.	12.00
Vesta.	12.00
Berdon.	10.00
Delco Oakland.	10.00
Bijur. Series 51-30-5.	15.00
Ward Leonard for King.	15.00
Rushmore No. 1.	15.00
New Remy Generators (Round Type) with relay.	18.00
Remy with distributor.	20.00
Westinghouse with distributor 230-221.	25.00
Leece-Neville, 12 volt.	16.50
Northwestern.	10.00
Autolite.	10.00-15.00
New Westinghouse 209 R.	20.00

STARTERS

Autolite No. 7049-2407-6145.	\$15.00-\$20.00
Autolite for Abbott.	15.00
Gray Davis Chalmers.	20.00
Leece-Neville Haynes.	20.00
Gray Davis, Lozier and others.	30.00
Autolite, Overland 79, 81, 82.	
.....	15.00-20.00
Bijur Apperson.	25.00
Allis Chalmers.	15.00
Remy 182.	20.00
Packard.	20.00
Deaco.	20.00
Starter for Palmer Singer.	20.00
Westinghouse 533-S W 103.	25.00
Allis Chalmers.	15.00
Wagner for King.	20.00

SECOND-HAND CAR DEPT.

\$150.00 to \$550.00
50 to 75 exceptionally good used cars at prices so low that they would even interest dealers.

SPEEDOMETER HEADS

Stewart or Warner.	\$1.50 to \$4.00
New Stewart with 36-in. shaft.	6.00
Pyrene Fire Extinguishers.	6.00

DEPOSIT REQUIRED
WITH
ALL ORDERS

BARGAINS IN NEW PARTS AND MATERIAL COMPLETE LINE OF NEW PARTS For 13-14-15 Velie & Stoddard Dayton Cars

New 1 and 1 1/2 ton truck bodies 60.00	25c; 2 1/4-in. 27 1/2c; 2 1/2-in. 30c;
New Hartford shock absorbers	2 3/4-in. 32 1/2c.
with fittings, set of four. 12.00	
New Autolite ammeters, 20	
amp. \$1.50; 30 amp. 2.00	
New One-Man Top Wind-	
shields 8.00	
Connecticut 3-button switches 1.75	
National Standard Medium	
Jacks 1.50	
Heavy Grease Guns. ....	.50
14,000 ft. new radiator hose. Price	
per ft., 1-in. 15c; 1 1/4-in. 17 1/2c;	
1 1/2-in. 20c; 2-in. 22c; 2 1/2-in. 25c	

NEW & USED GEARS & BEARINGS

New Bailey Differentials for Overland Models, 60, 81, 83.\$10.00

Prest-O-Lite Tanks

Model B.\$4.00 each; E.\$3.00 each
Searchlight Tanks.\$2.00

New 4-Passenger Roadster Tops, complete.\$35.00

NEW WIRE WHEELS FOR FORDS

Set of 4 wheels and 5 rims, \$45.00, \$5.00 allowance for old wheels.
Demountable Rims for your Ford Wheels 30x3 1/2—Set of 5 with 4 filler hands \$8.50.

NEW SOLID TRUCK TIRES at Exceptionally Low Prices NEW TIRES—5000 Mile Guarantee

Size	Ribbed Tread	Non-Skid	Size	Ribbed Tread	Non-Skid
30x3	\$10.00	34x4	.....	\$21.00 \$22.50
30x3 1/2	12.50	35x4 1/2	.....	21.00 22.50
31x3 1/2	12.50	35x4 1/2	.....	25.00 27.50
32x3 1/2	\$15.00	35x5 1/2	.....	27.50 30.00
31x4	20.00	35x5	.....	30.00 32.50
32x4	17.50	37x5	.....	32.50 35.00
33x4	20.00			

10% Deposit Required with each tire ordered
Balance C. O. D. subject to examination

NEW RELINERS

80x3	.....	\$1.75	34x4	.....	\$3.00
30x3 1/2	.....	2.00	36x4	.....	3.50
32x3 1/2	.....	2.25	35x4 1/2	.....	3.25
32x4	.....	2.50	36x4 1/2	.....	3.50
33x4	.....	3.00	37x4 1/2	.....	3.75

GOOD USED TIRES AND TUBES OBTAINED FROM WRECKED CARS

WRITE FOR PRICES

MAIL ORDERS SHIPPED SAME DAY
HIGHEST PRICES PAID FOR WRECKED CARS

WARSHAWSKY & CO. LARGEST CAR WRECKERS IN THE WORLD

1915 SOUTH STATE STREET

PHONE CALUMET 7315

CHICAGO, U. S. A.

Parts and Repairs

Parts and Repairs

Parts and Repairs

PARTS FOR ALL CARS

We Save You 50 to 80% of the Original Cost

SATISFACTION OR YOUR MONEY BACK

New Spotlights, 5" lens with mirror\$3.48

Prest-O-Lite Tanks

Model B.....\$4.00 ea.
Model E..... 3.00 ea.
Searchlite Tanks. 2.00 ea.

COILS

Bosch Type A.....\$6.50
Eisemann 3.50
Spiltdorf 3.50

STARTERS

Gray & Davis.....\$14.00
Auto Lite, Bendix Drive..... 17.50
Jones Starter and Generator..... 20.00

GENERATORS

Gray & Davis.....\$14.00
Remy 12.00
Vesta 10.00
Silent Starter and Generator
Chains, all lengths and sizes.
Lighting and Starting Batteries\$6.00 to \$15.00
Rims 1.50 to 3.50
Carburetors 3.50 to 7.50

5% Off for Cash in Full with Order.

Deposit Required with All Orders.

Get Our Prices on New Tires.

Magnetos Overhauled and Guaranteed

Bosch DU4 Variable.....\$27.50	Bosch DR4 19.50	Bosch D6 15.00
Bosch DU4 Set Spark..... 25.00	Bosch DR6 20.00	Eisemann 12.00
New Bosch DU4 Variable 35.00	Bosch ZR6 35.00	Remy 6.00
Bosch DU6 29.00	New Bosch ZR6 40.00	Dixie 12.00
	Bosch D4 14.00	

OUR SLIGHTLY USED Tires and Tubes

OBTAINED from WRECKED CARS
Mean Economy to You—A Trial Will Convince You

Size	Tires	Tubes
30x3	4.50	\$1.35
30x3 1/2	5.50	1.45
31x3 1/2	5.75	1.50
32x3 1/2	6.00	1.50
34x3 1/2	6.50	1.60
31x4	7.00	1.65
32x4	7.75	1.60
33x4	8.50	1.70
33x4 1/2	9.00	1.75
34x4	9.50	1.70
35x4	9.00	1.75
34x4 1/2	9.25	1.80
35x4 1/2	9.50	1.85
38x4 1/2	15.00	2.50
40x4 1/2	15.00	2.50
42x4 1/2	15.00	2.50
35x5	10.25	2.00
36x5	10.25	2.00
37x5	10.75	2.20
38x5 1/2	15.00	2.50
40x4 Non Skid..... 15.00		
43x4 1/2 Cl. Non Skid..... 15.00		

Express Must Be Prepaid on Old Tires Sent to Us.

Special New Clincher Tires

32x4.....\$10.00 33x4 1/2.....\$12.50 34x5.....\$12.50

Double tread Tires

Selected from best used material obtainable.
Retainers, \$1.25 Extra

Two tires, one with good top and other with good sidewalls are trimmed, cemented and sewed firmly together by Campbell lock stitch method, twelve to fourteen plies fabric making puncture and blowout almost impossible.

Size	Complete tire	You furnish one tire	You furnish both
28x3	\$4.15	\$3.00	\$1.50
30x3	4.75	3.35	1.50
30x3 1/2	5.80	4.25	2.00
31x3 1/2	6.50	4.50	2.00
32x3 1/2	6.75	5.25	2.00
34x3 1/2	7.00	5.80	2.25
31x4	6.95	5.75	2.50
32x4	7.15	5.65	2.50
33x4	7.80	6.25	2.50
34x4	8.00	6.45	2.50
35x4	8.75	7.15	2.50
36x4	9.40	7.50	2.50
38x4 1/2	9.25	7.60	3.00
34x4 1/2	9.65	8.00	3.00
35x4 1/2	10.15	8.20	3.00

NEW GEARS FOR ALL CARS

REBUILT BATTERIES

Guaranteed for 6 Months
6 Volt Starting and Lighting Batteries.....\$13.50
12 Volt Starting and Lighting Batteries 18.50

MOTORS

In Excellent Condition
Continental, Model E.....\$75.00
E. M. F. 30..... 50.00
4 cyl. Studebaker 25..... 50.00
4 cyl. Everett 30..... 45.00
4 cyl. Davis 30..... 50.00
Overland 69..... 60.00
Overland 53A with starter and generator 100.00
Overland 53B block motor with starter and gen. 90.00

UNIT POWER PLANTS

Continental, Model E.....\$115.00
Chalmers 30 65.00
Rutenber Cyl. 80.00
Radiators\$10.00 and up
Speedometer Heads.....\$1.00 to \$3.00
Axle Shafts\$2.50 to \$7.50
Front Axles Springs
Rear Axles Transmission Gears
Transmissions Differential Gears
Roller Ball Bearings (All Makes).
\$1.00 to \$3.50. Pistons, Cylinder Blocks, Crank and Camshafts, etc.

Full Cash Refunds, less Express Charges, Allowed on Returned Goods.
Prompt Attention to Your Orders.

MOTOR SALVAGE CO.

1425 S. State St. CHICAGO, ILL.

Get It When You Want It

A Million Parts a Year Pass Through Our Great Shops—Immense Variety Always on Hand. Bargains

A Partial List of Big Savings In Stock Now!

MOTORS
B M F 30.....\$50.00
Flanders 20 40.00
Studebaker 6-15 75.00
Studebaker 4-17 100.00
Studebaker 6-17 with Starter and Generator..... 175.00
Stoddard Dayton 30..... 60.00
Stoddard Dayton Savoy..... 75.00
Stoddard Dayton 45..... 75.00
Marion 1912 75.00
Kissell 1912 75.00
Stafford 75.00
Moon 1913 75.00
Interstate 75.00
Case 1914 75.00
Overland 56 50.00
Overland 69 50.00
Overland 81 75.00
Chalmers 26-B 6 1915..... 100.00
Packard 6-38 175.00
Mitchell 6-17 100.00

UNIT PLANTS
Paige 6-46\$175.00
Nyberg 6 75.00
Crow-Ellkhart, Lyeoming
D U X 125.00
Chalmers Model 17..... 75.00
Elgin 6 Falls Motor..... 125.00

Hudson 6-54 125.00
Chandler 6-1915 150.00
Perkins 8-cyl. with Starter & Generator..... 150.00
Wisconsin C U 3 1/2 5 25.00
Starter & Generator..... 125.00
Pathfinder 12-cyl. Starter & Generator 400.00
Continental 7 n 1917 Starter & Generator..... 250.00

STARTERS
Auto Lite Patterson.....\$ 5.00
Auto Lite Abbott Detroit. 15.00
Auto Lite Overland 81 12.50
Auto Lite Overland 83 12.50
Auto Lite Overland 75 12.50
Westinghouse Frame 300 20.00
Wagner Model 154 15.00
Wagner Model 168 20.00
Gray & Davis Type Y Metz 10.00
Gray & Davis Type Y 10.00
Maxwell 10.00
Gray & Davis Paige 4-38 15.00
Ward Leonard Moline 10.00
Remy Model 182 15.00
Remy Model 4 Reo 1914 15.00
Simms Huff Starter & Generator 20.00
Leece Neville Haynes 20.00

NEW TIRES--CHEAP

We bought a carload, all firsts, guaranteed 5,000 miles, not damaged or old stock. Serial numbers and maker's name intact, which will carry factory, as well as our guarantee.

30x3 1/2 rib.....\$12.88	34x4 1/2 rib..... 30.06
31x4 rib..... 20.06	35x5 N. S..... 41.36
31x4 N. S..... 21.74	36x4 1/2 rib..... 31.52
33x4 rib..... 21.60	36x4 1/2 N. S..... 33.91
33x4 N. S..... 22.20	37x5 rib..... 38.62
34x4 rib..... 21.92	37x5 Q. D. N. S..... 43.54
34x4 N. S..... 23.81	

Mail orders filled promptly. Cash with order or 25 per cent deposit, balance C O.D.

TUBES

30x3 .....\$2.00	33x4 .....\$2.50
30x3 1/2 2.25	34x4 2.50
32x4 2.50	

IRON CLAD GUARANTEE: Absolute Satisfaction or Money Immediately Refunded. No Quibbling on Our Part

The Original "We Tear 'Em Up and Sell the Pieces"

AUTO WRECKING COMPANY

13th and Oak Streets

Kansas City, Mo.

Parts and Repairs

Parts and Repairs

Parts and Repairs

Prompt Service Satisfaction Guaranteed	
Overhauled and Guaranteed	
MAGNETOS	
Bosch D. U. 4 Set	
Spark	\$22.50
Bosch D. U. 4 Variable	
ble	25.00
Bosch D. U. 6	27.50
Bosch D. R. 4	20.00
Bosch D. R. 4-2 spark	65.00
Bosch D. R. 6	25.00
Bosch D. 4	15.00
Bosch D. 6	16.00
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What do you need? Let us send you special prices. Get our complete list and look it over. See what you can save.

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Build Your Own Car

100 Pressed Steel Frames, new..... \$ 15.00 each
125 6-Cylinder Motors, new..... 150.00 each
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Complete Motors, Transmissions and Rear Axles. Money refunded on all parts within 10 days if unsatisfactory.

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And furnish them when you
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4-cyl. Motor..... \$90.00
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We guarantee these parts to be in excellent condition. Any part for M. 1915 Reo; wire or write.

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Satisfaction Guaranteed. Try Us.
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Magnetos 4.00 " New Spotlights. 2.00 "
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Roadster \$ 8.75
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12, 13, 14, 4-
Cyl. 14, Big
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42
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of used parts from 50 to 75 per cent off manufacturer's
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pinions for all makes of cars.**EUREKA AUTO PARTS COMPANY**

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CRAIG-HUNT Parts are the safest and BEST

COMPLETE SET, for lowering the Ford Frame

\$25.00

We make 16 valve Racing Heads, Racing Bodies,
Pistons and counterbalances for the Ford**CRAIG-HUNT, Inc.**

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Lozier Owners—Why buy counterfeit
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Parts. Made from original patterns.
Order from headquarters.**LOZIER MOTOR COMPANY**
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MAKES WHEELS**Pneumatic Tire Wheels for Ford Trucks.
Five Detachable Wire Wheels for Fords.

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Standard Brand

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Guaranteed for One Year

OUR PRICES

Size	Ribbed	Non-Skid	Tube
30x3\$9.12		\$2.00
30x3½11.76	\$12.39	2.45
32x3½	.....13.89	14.55	2.55
31x4	.....18.15	19.05	3.20
32x4	.....18.48	19.38	3.35
33x4	.....19.29	20.22	3.45
34x4	.....19.77	20.73	3.55
35x4½	.....27.84	29.16	4.45

10% deposit required with order, bal-
ance C. O. D., subject to examination.

Special proposition to dealers.

The Armstrong Tire Co.

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SLIGHTLY USED AND FACTORY REPAIRED
TIRES AND NEW TUBES—QUALITY ABOVE ALL

The QUALITY of our tires and tubes is superlative, the PRICE cannot be equaled and our SERVICE cannot be excelled

A SATISFIED CUSTOMER IS OUR BIGGEST ASSET, THEREFORE
WE MUST SATISFY YOU

Size	Used Tire	New Tire	Size	Used Tire	New Tire	Size	Used Tire	New Tire
30x3	\$4.00	\$1.95	32x4	\$7.25	\$3.05	35x4 1/2	\$8.75	\$4.25
30x3 1/2	5.00	2.30	33x4	8.00	3.25	36x4 1/2	9.00	4.40
32x3 1/2	5.50	2.40	34x4	8.00	3.40	36x5	9.75	4.60
34x3 1/2	6.00	2.60	35x4	8.25	3.50	36x5 1/2	9.75	4.70
31x4	6.50	3.00	34x4 1/2	8.50	4.15	37x5	10.00	4.75

Send \$1.00 deposit with each tire ordered. Tires will be sent promptly, with privilege of examination, and balance C. O. D. Specify style of rim to avoid delay.

Our Used Tires are not guaranteed for any definite number of miles, but we will make reasonable adjustments on all tires that do not give service in proportion to the price paid, providing tires are returned to us by prepaid express. Is not this fair enough?

WE CARRY A COMPLETE STOCK OF NEW TIRES—
WRITE FOR PRICES.

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Over \$100,000 stock of HIGH GRADE TIRES

Which were slightly blemished in the manufacture. These blemishes do not, in any way, interfere with the wearing quality of these tires, but are simply sold without our regular 5,000-mile guarantee.

Just order a few of these high-grade tires, and if, when you receive them, they are not entirely satisfactory to you, return them to us immediately and we will cheerfully refund your money, providing the tires have not been used. These Tires are the best trade builders any dealer could buy. Don't let an opportunity of this kind slip through your fingers. ORDER TODAY, while our stock is complete and you can get any size you may need.

PRICES TO DEALERS ONLY

Non-Skid	Inner Tubes	Non-Skid	Inner Tubes	Non-Skid	Inner Tubes
28x3 \$ 9.00	\$1.95	32x3 1/2 \$12.50	\$2.70	34x4 \$17.40	\$3.65
30x3 8.50	2.15	31x4 16.05	3.35	35x4 1/2 24.10	4.50
30x3 1/2 10.75	2.50	32x4 16.30	3.45	35x5 27.40	5.25
31x3 1/2 11.30	2.60	33x4 17.05	3.55	37x5 28.10	5.50

TERMS: 10% deposit and we will ship balance C. O. D.

Orders Filled Same Day Received

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SLIGHTLY USED TIRES

OBTAINED FROM WRECKED CARS AND
FACTORY REPAIRED

Size	Tires	Tubes	Size	Tires	Tubes
30x3	\$4.50	\$1.35	34x4 1/2	9.00	1.75
30x3 1/2	5.50	1.45	35x4 1/2	9.25	1.80
32x3 1/2	6.00	1.50	36x4 1/2	9.50	1.85
31x4	7.00	1.65	38x4 1/2	15.00	2.50
32x4	7.75	1.60	40x4 1/2	15.00	2.50
33x4	8.50	1.70	42x4 1/2	25.00	4.00
34x4	8.50	1.70	35x5	10.25	2.00
35x4	9.00	1.75	36x5	10.25	2.00
33x4 1/2	9.00	1.75	37x5	10.75	2.20
			38x5 1/2	15.00	2.50

\$1.00 Deposit Required With Each Tire Ordered, Balance C. O. D. Subject to Examination. Specify Style of Rim.

AUTO NEEDS COMPANY

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NEW TIRES

NEW, FRESH STOCK
Exceptional Bargains

Size	Tires	Tubes	Size	Tires	Tubes
28x3	\$ 8.60	\$1.85	35x4	\$20.60	\$3.50
30x3	8.35	1.80	33x4 1/2	23.60	3.75
30x3 1/2	10.80	2.20	34x4 1/2	24.40	3.90
32x3 1/2	12.70	2.30	35x4 1/2	25.50	4.05
34x3 1/2	14.80	2.70	36x4 1/2	25.90	4.60
31x4	16.65	2.85	35x5	29.10	4.90
32x4	16.95	2.90	36x5	29.90	4.75
33x4	17.70	3.00	37x5	30.75	4.90
34x4	18.10	3.10			

ADD 10% FOR NON-SKID

USED TIRES
ALL KINDS OF TIRES
S. S. Clincher and Q. D. Tires, Plain or Non-Skid Tires. Cord Tires, Fabric Tires. New or Used Tires. All kinds—all makes.
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TIRE SPECIALISTS
USED TIRES

Good Double Tread Tires, All Sizes
Guaranteed 3000 Miles
30x3 \$ 5.25
30x3 1/2 6.25
32x3 1/2 7.50
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Rebuilt free with each tire.
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No Deposit Required
ON OUR TIRES

Demonstrating

All Non-Skid **TIRES** All Non-Skid

They Are MUCH BETTER
Than the Ordinary Used Tires

Size	Tire	Tube	Size	Tire	Tube
30x3	\$ 6.50	\$1.75	33x4 1/2	13.50	2.50
30x3 1/2	7.50	1.99	34x4 1/2	13.50	\$2.60
32x3 1/2	9.00	2.00	35x4 1/2	14.00	2.65
31x4	9.50	2.15	36x4 1/2	15.00	2.75
32x4	10.50	2.15	38x4 1/2	22.00	...
33x4	11.50	2.25	35x5	15.50	2.85
34x4	12.50	2.35	37x5	16.50	2.95
32x4 1/2	13.00	2.35	37x5 1/2	18.00	...
			38x5 1/2	25.00	...

5 Per Cent Off for Cash In Full with Order. Otherwise, goods shipped C. O. D., subject to examination. Specify whether clincher or straight side.

Royal Tire & Supply Co.
1461 Michigan Avenue CHICAGO, ILL.

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Are highly serviceable if cured in the proper mold. In buying your new mold be sure that it has:

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STEAM GAUGE. That registers accurately.

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32x3½	6.35	1.80	35x4½	9.85	2.50
34x3½	7.50	1.90	36x4½	10.35	2.50
31x4	7.35	2.10	37x4½	11.00	2.50
32x4	7.60	2.20	35x5	11.10	2.50
33x4	7.85	2.25	36x5	11.35	2.00
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Size	Plain	Non-Skid	New Tubes
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30x3½	9.75	10.85	2.10
32x3½	11.55	13.10	2.25
31x4		16.80	2.60
22x4	15.15	16.95	2.75
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Miscellaneous. Help Wanted
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GOVERNMENT SALE OF COLLAPSIBLE CANVAS BASINS, 2,000.—Sealed bids will be opened 10 A. M., October 10, 1919, at Zone Supply Office, 2d and Arsenal Sts., St. Louis, Mo. Particulars, special bid forms, may be obtained at above Office or Zone Supply Offices, attention Surplus Property Officer, following cities: Boston, New York, Newport News, Philadelphia, Baltimore, Atlanta, Jeffersonville, Ind., Chicago, New Orleans, San Antonio, Omaha, El Paso, San Francisco. Refer to S. P. D. No. 3135 CE.

GOVERNMENT SALE OF STEEL FOR SPIDERS AND SPINDLES, 88,174 lbs.—Sealed bids will be opened 10 A. M., Sept. 23, 1919, at Zone Supply Office, 1819 W. 39th St., Chicago. Particulars, special bid forms, may be obtained upon application to above Office or Zone Supply Office, attention Surplus Property Officer, following cities: Boston, New York, Philadelphia, Baltimore, Newport News, Atlanta, Jeffersonville, Ind., St. Louis, New Orleans, San Antonio, Omaha, El Paso, San Francisco. Refer to S. P. D. No. 2267 MV.

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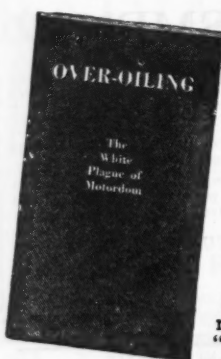
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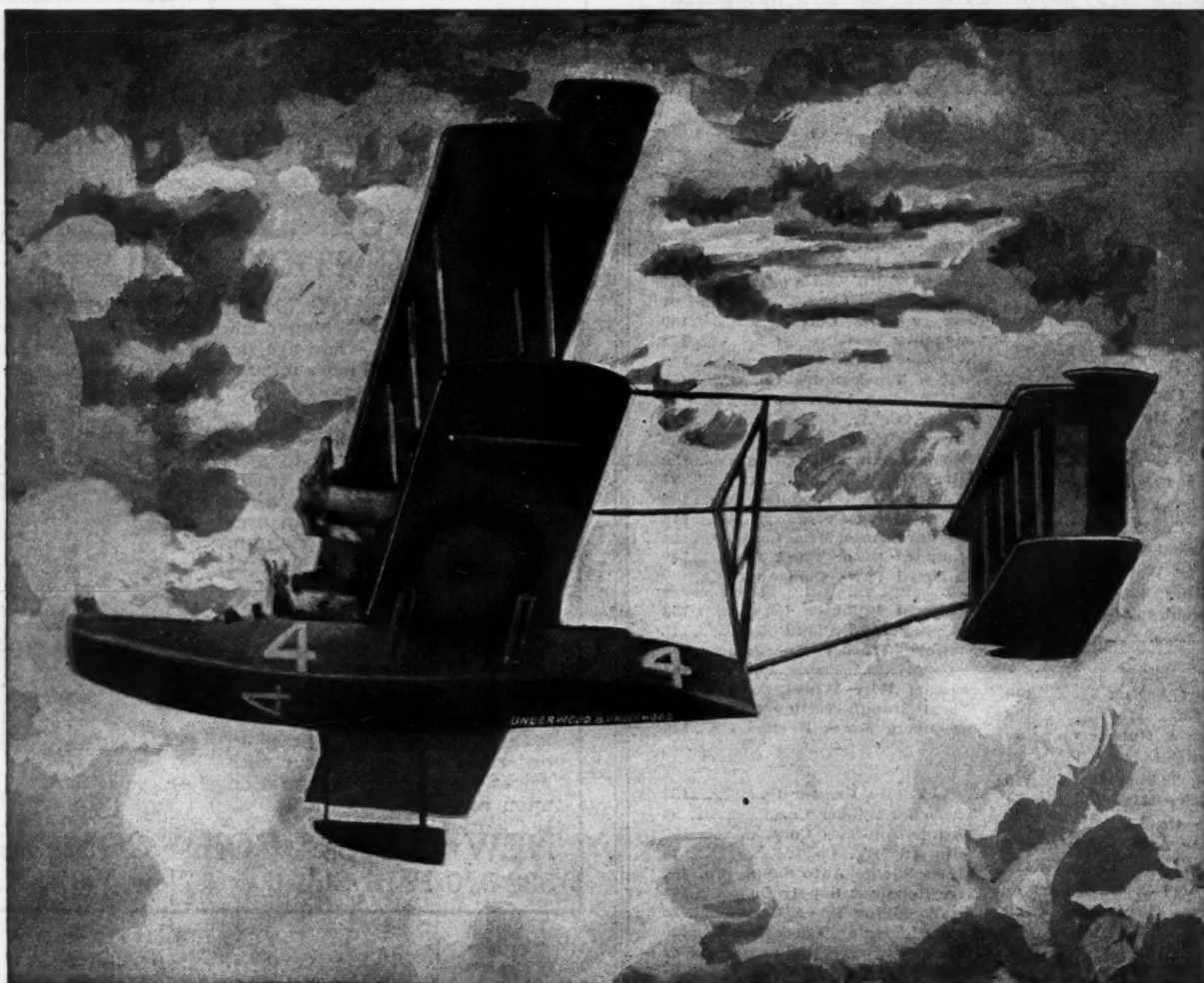
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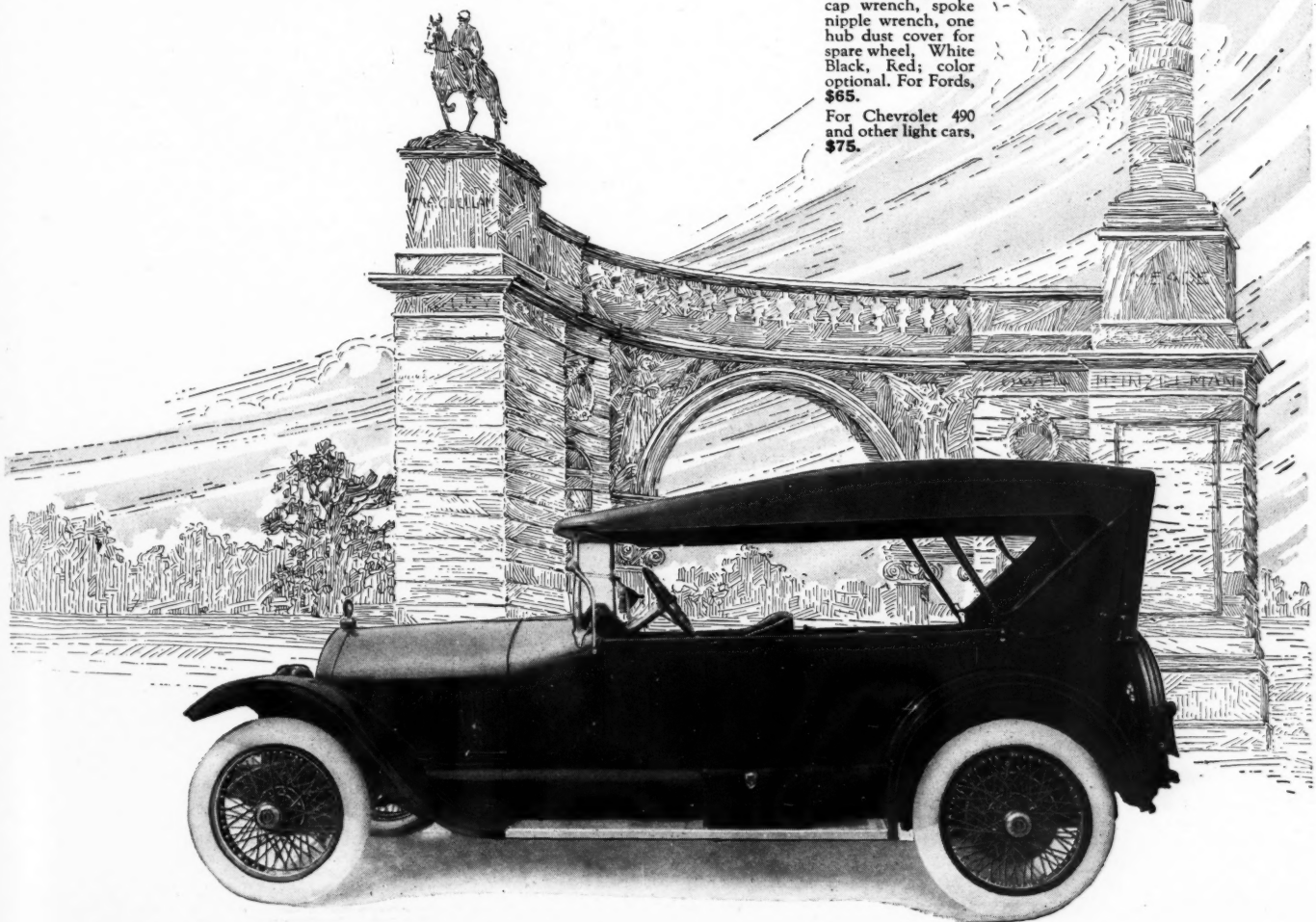
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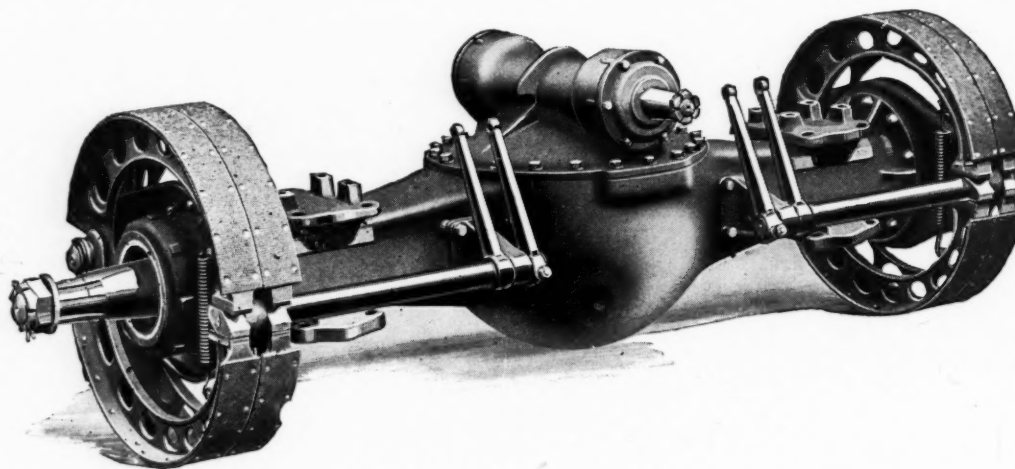
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